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Summary of monitoring and live gene bank activities for inner Bay of Fundy Atlantic salmon in 2003

Résumé des activités de surveillance et de la banque de gènes vivants pour le saumon atlantique de l'intérieur de la baie de Fundy en 2003

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Abstract

This document contains a summary of monitoring activities for inner Bay of Fundy Atlantic salmon in 2003. Activities include electrofishing surveys for juvenile Atlantic salmon in 15 rivers, mark-recapture estimates of the number of smolts emigrating from the Big Salmon River and the Gaspereau River, a mark-recapture estimate of the number of adults returning to the Big Salmon River, counts of salmon returning to the Gaspereau River, and a preliminary evaluation of the effectiveness of release of mature, adult salmon in the Salmon River, Colchester County. A summary of Live Gene Bank collections, holdings and releases is also provided.

Electrofishing surveys located age-0 salmon parr in two of 10 rivers without Live Gene Bank support. No juvenile salmon were captured in five of these rivers. Seven adult salmon were counted at an assessment facility on the Gaspereau River, down from 102 salmon counted in 1997. Using a mark-recapture experiment, 21 adult salmon were estimated to have returned to the Big Salmon River in 2003. No repeat-spawning adults were detected in the Gaspereau River, and only one of six salmon sampled from the Big Salmon River had previously spawned. Rivers with Live Gene Bank support contain juvenile salmon and appear capable of producing smolt, but return rates are about one adult returning for every 300 wild smolts that leave the river and between one and three adults returning for every 10,000 smolts released from the Live Gene Bank.

During 2003, an assessment of the status of inner Bay of Fundy Atlantic salmon documented declines in population size during the last 30 years that were greater than 99% for Stewiacke River and greater than 95% for the Big Salmon River. A review of electrofishing data indicated that the declines were widespread throughout the inner Bay, and were ongoing. None of the information collected in 2003 indicates a reversal of these patterns.

Résumé

Ce document présente un résumé des activités de surveillance du saumon atlantique de l'intérieur de la baie de Fundy en 2003. Ces activités comprennent des relevés de pêche électrique pour estimer l'abondance de saumons atlantiques juvéniles dans 15 rivières, des estimations par marquage-recapture du nombre de saumoneaux qui quittent les rivières Big Salmon et Gaspereau, une estimation par marquage-recapture du nombre d'adultes qui remonte la rivière Big Salmon, un dénombrement des saumons qui remontent la rivière Gaspereau et une évaluation préliminaire de l'efficacité de la remise à l'eau de saumons adultes matures dans la rivière Salmon (comté de Colchester). Un résumé des activités en rapport avec la banque de gènes vivants (capture, élevage et remise à l'eau) est également présenté dans ce document.

Les relevés de pêche électrique ont permis de repérer des tacons d'âge 0 dans deux des dix rivières non ensemencées de saumons provenant de la banque de gènes vivants. Aucun juvénile n'a été capturé dans cinq de ces rivières. Sept saumons adultes ont été recensés à une installation d'évaluation sur les rives de la rivière Gaspereau, comparativement à 102 saumons au même endroit en 1997. Une étude de marquage-recapture a permis d'estimer à 21 le nombre de saumons adultes qui ont remonté la rivière Big Salmon en 2003. Tous les adultes détectés dans la rivière Gaspereau en étaient à leur première remonte, et un seul des six saumons échantillonnés dans la rivière Big Salmon avait déjà frayé auparavant. Les rivières ensemencées de saumons provenant de la banque de gènes vivants contiennent des juvéniles et semblent aptes à produire des saumoneaux, mais le taux de remonte est d'environ un adulte par tranche de 300 saumoneaux sauvages qui quittent la rivière et entre un et trois adultes par tranche de 10 000 saumoneaux provenant de la banque de gènes vivants.

En 2003, une évaluation de l'état du stock de saumon atlantique de l'intérieur de la baie de Fundy a montré qu'au cours des 30 dernières années, l'abondance a baissé de plus de 99 % dans la rivière Stewiacke et de plus de 95 % dans la rivière Big Salmon. Un examen des données sur la pêche électrique a révélé que la baisse d'effectif a touché l'ensemble de la partie intérieure de la baie de Fundy et que cette baisse se poursuit. Aucune donnée recueillie en 2003 n'indique un revirement de situation.

Introduction

Inner Bay of Fundy (iBoF) Atlantic salmon (*Salmo salar*) are presently at critically low levels and were listed as endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in May, 2001. This assemblage includes salmon native to rivers in the Bay of Fundy, east of the Saint John River, New Brunswick, and east of the Annapolis River, Nova Scotia, exclusive of these rivers (Figure 1). Based on historic, reported recreational catches, salmon were known to have occupied 32 iBoF rivers: 22 rivers of Salmon Fishing Area (SFA) 22 in Nova Scotia and 10 rivers of SFA 23 in New Brunswick. Salmon are suspected to have occupied most rivers and streams where migration was not obstructed by natural barriers (Amiro 2003). Historically, catches of iBoF salmon averaged 1,061 fish in the commercial fishery (1970-1984), and 1,462 small salmon and 597 large salmon in the recreational fishery (1970-1990). Two rivers, the Big Salmon River, New Brunswick, and Stewiacke River, Nova Scotia, accounted for more than half of the historic iBoF recreational catch.

Salmon of the iBoF are composed of at least two distinct population segments with independent evolutionary histories (Verspoor et al. 2002). The distinctness of iBoF salmon from other populations has been recognised for over a century (Perley 1852). This recognition was based on observation that salmon usually enter these rivers in the fall of the year, have a high proportion that return to spawn after one winter at sea and have annual population abundance that differs from other salmon stocks. Tagging of wild and hatchery smolts indicated that salmon from iBoF rivers rarely migrate to the North Atlantic Ocean (Amiro et al. 2003), and had higher survival between consecutive spawning years (Amiro 2003).

IBoF rivers have a variety of habitats and are well suited to the production of salmon. In general, habitat is impacted by forest harvesting and agriculture practices to varying degrees but, because of the underlying geology, waters in rivers of the iBoF are not susceptible to acidification. Some rivers, such as the Petitcodiac, Shepody and Avon Rivers, have tidal barriers with reduced or no fish passage resulting in the reduction or elimination of salmon production in the watersheds. The Petitcodiac River represents about 22% of the salmon production potential of the inner Bay of Fundy. However, moderate-to-high production of salmon has been documented in many iBoF rivers as recently as 1989 and no widespread degradation of freshwater habitat is known to have occurred since.

A Live Gene Bank (LGB) program designed to reduce the probability of extirpation of inner Bay of Fundy salmon was initiated in 1998. The purpose of this program is to maintain the potential for iBoF salmon recovery by preserving the genetic base thought to be representative of the population. Wild parr were collected from the two rivers with the principle salmon populations of the inner Bay of Fundy, the Big Salmon and Stewiacke. These parr were reared to maturity in a biosecure environment in fresh water, mated according to a prescribed mating strategy to limit losses in genetic diversity, and the progeny released. Additional collections were made in subsequent years and the program was broadened to include nine other rivers in the program, the Gaspereau, Folly, Economy, Great Village, Harrington, Portapique, Debert, Black and the Irish. The LGB program

consists of two components: the captive and "in-river" live gene banks. Fish of various ages, from eggs to adults, are being held in captivity to help prevent the loss of these stocks. Since the onset of the program (the first releases from the iBoF LGB occurred in 2001), the release of salmon into iBoF rivers has been part of the "in-river" component of the program, where salmon of various ages are released into the rivers to provide exposure to the natural environment to allow natural selection to occur. A portion of these fish is then captured and brought back into the captive component of the program and mated according to a prescribed strategy. In this way, salmon populations are being maintained through supportive rearing while attempting to limit the effects of domestication and selection of deleterious traits at times associated with fish culture programs.

A formal assessment of the status of salmon in iBoF rivers was conducted during 2003 (O'Boyle 2003). Declines in abundance of salmon of greater than 99% in the Stewiacke River (Gibson and Amiro 2003), and about 95% in the Big Salmon River (Gibson et al. 2003b) were documented during that assessment. Electrofishing in 44 iBoF rivers indicated that the declines are widespread throughout this area (Gibson et al. 2003a). These declines appear to be ongoing in rivers without LGB support.

The purpose of this document is to summarize monitoring and LGB activities related to inner Bay of Fundy Atlantic salmon principally during 2003, including:

- electrofishing surveys for juvenile salmon;
- smolt and adult monitoring on the Big Salmon River, NB;
- smolt and adult monitoring on the Gaspereau River, NS;
- smolt monitoring on the Upper Salmon River, NB;
- a preliminary evaluation of an adult release project on the Salmon River (Colchester County, NS);
- the iBoF LGB Program collections, holdings and releases in 2003.

Electrofishing Surveys

For the most part, electrofishing surveys were conducted using backpack electrofishers by crews of two to four people. Barrier nets were used in a few multiple pass surveys, but not at most sites. Details of the surveys, including site coordinates, area, fishing effort and catch, are provided in Appendix 1.

In total, 112 sites were electrofished in 16 rivers during 2003 (Figure 2; Appendix I). During the first pass of these surveys, a total effort of 113,000 seconds of shocking time was applied over about 65,000 m^2 of habitat (Appendix I). A total of 24,457 fish were captured during the first pass of all surveys combined, including 2,045 Atlantic salmon (Appendix I). Only 118 Atlantic salmon were captured during the first pass of electrofishing surveys on rivers without LGB support. Of these, one salmon was captured in the North River, two in Great Village River, two in Upper Salmon River, 24 in Point Wolfe River, and 89 in Black River. Salmon were not captured in five other rivers without LGB support. The remaining 1,927 salmon were captured in rivers with LGB support.

Gibson et al. (2003a) analyzed electrofishing catchability using data from 44 mark-recapture experiments on inner Bay of Fundy rivers in 2000 and 2002. Using an empirical Bayes method to estimate the probability density for the probability of catching a salmon, they found that the catchability of salmon in these rivers averaged 42.8% (90% C.I. of 26.1% to 61.3%). Here, we used their average catchability to estimate the density of salmon at each electrofishing site.

Densities of Atlantic salmon in 2003 were highest in rivers with LGB support (Figure 3). Salmon were not captured in five of the 10 rivers without LGB support that were included in the survey (Table 1). Only three age-0 salmon were captured in rivers without LGB support, all of which came from Point Wolfe River, indicating that very few salmon spawned in these rivers during 2002. The high densities of juvenile salmon at some sites in LGB-supported rivers are the result of electrofishing near release sites.

In the analysis presented, an electrofishing catchability coefficient (42.8%) was applied to all electrofishing surveys to estimate salmon densities at each site. If the 5^{th} and 95^{th} percentiles of the probability density for this coefficient (see above) were used to estimate population density, estimated densities would be increased or decreased by a factor of about 1.5. The conclusion that densities of juvenile Atlantic salmon in iBoF rivers are at extremely low levels would not change as a result.

The status of the Atlantic salmon population in the Stewiacke River is assessed using juvenile abundance as an index of adult abundance. Juvenile densities in 2003 were highest since 1997 (Figure 4), and the number of sites that contain fry has slightly increased since 2000 (Figure 5). However, during 2002 and 2003, over 200,000 age-0 salmon have been released into the Stewiacke River as part of the wild component of the LGB program, and the increased densities observed in 2003 are likely due to these releases rather than increased spawning in the wild.

Gaspereau River Smolt Monitoring 2002 and 2003

The number of smolt emigrating from the Gaspereau River upstream of the White Rock Generating Station was estimated by mark-recapture during 2002 and 2003. In each year, 1,500 tagged, captive-reared smolts were released into the Gaspereau River upstream of the fish ladder bypassing the White Rock Generating Station (500 smolts were released at each of Lanes Mill, the Deep Hollow Bridge, and at the head of the White Rock Canal in each year). Release dates were May 8, 2002 and May 9, 2003.

In 2002, 1,500 tagged smolts were released into the population and 1,573 smolts were captured in the fish bypasses at the White Rock Generating Station and examined for tags, resulting in the recapture of 606 tagged smolts (Table 2). Based on these data, an estimated 3,973 smolts migrated past White Rock in 2002. Assuming a hypergeometric distribution for the probability of observing R recaptures given a population size N, M marked fish and C fish observed for marks, a likelihood ratio based 95% confidence interval for the number of emigrating smolts is 3,718 to 4,091 (Figure 6). The total number of smolts emigrating from the Gaspereau River would be higher because of production downstream of the White Rock Generating Station. The relative contribution of this area to smolt production in the

river is unknown. Of the 1,573 fish examined for marks, 13.9% were not adipose clipped, implying 542 smolts that are of wild-origin moved downstream past the White Rock Generating Station in 2002. In a sample of 102 non-adipose clipped smolts that were aged, 22 were age-2, 76 were age-3, two were age-4 and two were age-5.

In 2003, 1,500 tagged smolts were released into the population and 2,254 smolts were captured and examined for marks, resulting in the recapture of 446 tagged smolts (Table 3). Based on these data, an estimated 7,581 (95% C.I.: 7,088 to 8,140) smolts migrated past White Rock Generating Station in 2003 (Figure 7). Eight percent of the smolts captured were not adipose clipped, implying they were either of wild origin or were released into the river as fry during 2002.

Gaspereau River Adult Counts

A total of seven adult salmon ascended the White Rock fish ladder during 2003 (Table 4), representing about 5% of the conservation requirement for this river. Four of these fish were of wild origin and three originated from the LGB program (Table 5). All six fish that were aged were first time spawners. All seven fish were retained for the LGB program. The two hatchery-origin fish that were aged would have been released as smolt during 2002. Assuming the third hatchery-origin fish (also a small salmon) also originated from that release, the return rate of one-sea-winter (1SW) salmon from this release (16,508 smolt) is 0.02%. No two-sea-winter (2SW) salmon returned from the release of 10,860 smolt in 2001. In 2002, an estimated 542 wild smolts moved downstream past the White Rock Generating Station, resulting in a return of two wild 1SW salmon giving an estimated return rate for wild 1SW salmon of 0.83%. Two sources of error may affect these estimates: smolt production downstream of the White Rock Generating Station is not evaluated during the smolt counts and an assumption is made that all fish that return to the river ascend the White Rock ladder. These sources of error could lead to either under or over estimates of the return rates but the biases are not likely to be large enough to account for differences with the historic rates. For comparison, return rates of salmon to the Big Salmon River averaged 6% from 1967 to 1971 (Ritter 1989). The biases that may exist in the returns estimates presented above are not so great as to account for these differences.

Big Salmon River Smolt Monitoring in 2003

The smolt migration in the Big Salmon River was monitored using a rotary screw trap installed just above the Amateur Pool (Figure 8). The trap was monitored daily from May 6, 2003 to June 17, 2003 (exclusive of June 14th).

A population estimate was obtained using single census mark-recapture methods. Smolts were categorized as either non-adipose clipped (including wild-origin and captive-reared fish released as fry), captive-reared fish released as fall fingerlings in 2001 and 2002 (these fish were adipose clipped), or captive-reared smolts released during the spring of 2003 (also adipose clipped). A marked population was introduced to the river through the release of approximately 500 garment-tagged, captive-reared smolts at weekly intervals at Lodge Pool (Figure 8) throughout the migration period. Additionally, four out of five non-adipose

clipped smolts and all smolts released as captive-reared fall fingerlings were marked with clear streamer tags, transported upstream and released at Lodge Pool.

Excluding recaptures, a total of 2,025 smolts were captured, including 1,071 non-adipose clipped fish, 458 captive-reared fish released as fall fingerlings and 496 captive-reared fish released as smolts (Table 6). The first smolts were captured on May 8th and the last on June 17th, with the largest smolt catches occurring on May 26th and June 2nd. Scale analysis revealed that the majority (88%) of the non-adipose clipped smolts were age-2, whereas the majority (81%) of LGB progeny released as fall fingerlings were age-1 (Table 7).

Smolt wheel recapture rates were calculated for the non-adipose clipped, LGB fish released as fall fingerlings, and LGB fish released as smolts (Table 8). The highest recapture rate was 11.7% for non-adipose clipped smolts. LGB smolt recapture rates varied between color and averaged 4.3%. Due to the differences in recapture rates between groups, population size was estimated for each group individually. A total of 1,071 unmarked, non-adipose clipped smolts were captured at the smolt wheel (Table 6). Of these 841 were marked and released upstream at Lodge Pool of which 98 were recaptured at the smolt wheel. Based on these numbers, the maximum likelihood estimate for the number of non-adipose clipped smolts emigrating from Big Salmon River in 2003 is 9,191 (95% C.I: 7,761 to 11,178). In total, 458 unmarked smolts that had been released as fall fingerlings were captured by the smolt wheel. Of these, 441 were marked and released upstream at Lodge Pool, and of these, 33 were recaptured at the smolt wheel. Based on these numbers, the maximum likelihood estimate for the number of smolts released from the LGB as fall fingerlings emigrating from Big Salmon River in 2003 is 6,120 (95% C.I: 4,565 to 8,581).

The number of non-adipose clipped smolt migrating from Big Salmon River is roughly 30% of the average number emigrating during the 1966 to 1971 time period (Figure 9), and has increased slightly since 2001. Big Salmon River smolts captured in 2003 were tissue sampled and genotyped at six or seven highly variable tetranucleotide microsatellite markers. Multilocus genotype profiles from each smolt were then compared to existing genotype information from known parental crosses used to produce LGB-origin fry released into the Big Salmon River in 2001. Of the 223 smolts successfully analyzed, 79 (35.2%) were compatible with one or more LGB crosses conducted in the fall of 2000. Most or all of these smolts were likely descended from LGB parents, although it is possible that observed compatibilities occurred by chance, and that some smolts were actually progeny of wild spawning parents with similar microsatellite genotype profiles. Given the high levels of variablity observed in this population at the time the LGB program was initiated, and the information content of these 6-7 microsatellite markers, it is unlikely that many smolts were also compatible with wild spawning parents, although exclusion probabilities for the suite of molecular genetic markers used (based on the most appropriate wild baseline database available) have not been estimated. At present, it is not known what portion of the non-adipose clipped salmon are the result of production in the wild or the release of age-0 captive-reared fish in the earlier time period.

In 2002, about 34,000 adipose clipped age-0 parr were released into Big Salmon River. Assuming 81% of the fall fingerling released smolts captured in 2003 are age-1 (Table 7), this release resulted in the production of about 4,957 age-1 smolts. Similarly, the release of about 78,000 adipose clipped age-0 parr in 2001 resulted in about 1,162 age-2 smolts in 2003.

Big Salmon River Adult Surveys in 2003

The number of adult salmon returning to the Big Salmon River in 2003 was estimated by diver counts and a mark-recapture experiment. Sections of the river included in the survey are shown in Figure 8. On July 29th and 30th, 2003, one large and nine small salmon were observed during a dive count in the upper and lower sections of the river (Table 9). On September 8th and 9th, one large and 14 small salmon were observed, of which one large and six small salmon were captured and subsequently marked with disk tags. One of these fish was of hatchery origin, the other six were wild (Table 5). During a diver survey of the upper, middle and lower sections of the river on October 2nd, 12 fish were observed, including four of the seven marked fish. The resulting population estimate, based on a single census mark-recapture experiment, is 22 fish. If a binomial distribution is assumed for sampling errors (appropriate if sampling is with replacement, i.e., fish may be observed more than once) the corresponding 95% likelihood ratio-based confidence interval is 11 to 59 fish (Figure 10). If a hypergeometric distribution is assumed (appropriate if sampling is without replacement, i.e., fish may not be observed more than once), the 95% likelihood ratio-based confidence interval is 15 to 47 fish.

Six of the seven fish that were marked were not adipose clipped. The one salmon known to be of LGB origin (i.e., adipose clipped) was a small (53.7 cm fork length) male. If this sample is representative of the population, about three salmon known to be of LGB origin returned to the Big Salmon River in 2003. These fish likely originated from either the release of 19,725 captive-reared smolt in 2002 or the release of 77,718 age-0 parr during 2001. This latter release produced an estimated 2,000 smolt in 2002 (DFO 2003). Based on these values (21,725 smolt of LGB origin and three 1SW returns), the return rate of 1SW salmon in 2003 of LGB progeny released as age-0 parr that survived to smoltify in 2002 was 0.01%. In 2002, an estimated 5,300 non-adipose clipped smolt emigrated from Big Salmon River. Of the five wild fish that were aged, four were maiden 1SW fish. Assuming this ratio is representative of the population, about 14 adult 1SW salmon returned from the 2002 smolt year class (return rate = 0.3%).

The redd survey that was conducted annually from 1996 to 2002 was not conducted in 2003 due to high water conditions.

Upper Salmon River Smolt Monitoring in 2003

A total of 101 Atlantic salmon smolts were captured with a rotary screw trap in the Upper Salmon River in 2003. None of the smolts were sampled for biological characteristic data, but were immediately transported to the Mactaquac Biodiversity Facility to potentially contribute to the LGB program. As a result of the low number of smolts

captured, none were tagged, and the population size was therefore not estimated. The emigration of smolts in the Upper Salmon River took place from 09 May to 16 June.

iBoF Live Gene Bank Collections, Releases and Holdings: 2003

LGB progeny have been released into nine inner Bay of Fundy rivers between 2001 and 2003 (Table 10). All fish released into New Brunswick iBoF rivers were progeny of Big Salmon River salmon. In Nova Scotia, fish released in the Minas Basin rivers of the inner Bay of Fundy were of Stewiacke origin whereas those released into the Gaspereau River were of native origin.

In 2003, c.874,000 salmon were released from the LGB into eight iBoF Rivers (Table 10), including c.434,000 unfed fry, c.115,000 6-week old fry, c.227,000 age-0 parr, c.40,000 age-1 parr, c.58,000 smolts and 984 adults. About 34% of these fish were fry released into the Big Salmon River. Details of these releases are provided in Appendix 2.

A total of 883 salmon were collected from four rivers in the inner Bay of Fundy during 2003 and added to the LGB (Table 11). These fish include 18 age-0 parr, 489 age-1 or older parr, 369 smolts and 7 adults. As of December 2003, about 90,000 salmon are being held in the captive component of the iBoF LGB. Those holdings include: for the Nova Scotia stocks, 63,000 parr, 434 post smolt, and 719 adults; and, for the New Brunswick stocks, 24,000 parr, 1,066 post-smolt, and 884 adults (Table 12). Additionally, c.550,000 eggs for Nova Scotia stocks and c.1.2 million eggs for New Brunswick stocks were being held in the LGB as of that time.

Evaluation of adult salmon releases into Salmon River, Colchester County, Nova Scotia

The LGB program for iBoF salmon includes releasing fish of various life stages into the wild to expose them to natural selection and reduce the effects of domestication. As part of this component of the LGB program, adult fish were released into the Salmon River, Colchester County (Figure 11) during the falls (mid-October) of 2002 and 2003. The adults originated as parr collected from the Stewiacke River but were reared through the smolt stage, and until maturity, in the Coldbrook Biodiversity Facility, located on the Cornwallis River. These fish were spawned once in captivity prior to release. Although released as part of the recovery strategy, the project was also to determine: (1) if the adult fish would remain in the river through the normal spawning period; (2) attempt to spawn; (3) if spawning occurred, whether it was successful; and (4) if inferences could be made regarding mate choice using genetic analysis from progeny.

Salmon River, Colchester, was identified as the river of choice for several reasons: (1) because of its size with 1,346,800 m^2 of spawning and rearing habitat based on orthophoto interpreted stream areas between 0.12 and 3% gradient; (2) evidence that there were no wild salmon remaining in the river based on electrofishing surveys in summer 2002; and (3) because the river discharges into the Minas Basin as does the Stewiacke River.

Monitoring was carried out in this river during 2002 and 2003 to provide a preliminary evaluation of this project. Monitoring included tracking a portion of the fish released in 2002 using ultrasonics, electrofishing for age-0 progeny of these fish in 2003, and an adult salmon and redd survey to determine whether the fish released in 2003 were still present in the river or had spawned.

Adult releases and monitoring in 2002

A total of 189 reconditioned, sexually mature Atlantic salmon (fish that had been previously spawned in captivity) were released into Salmon River, Colchester County, on October 18, 2002 (ranging in size from about 1.5-3 kg). These fish came from the parr collected from the Stewiacke River in 1998, with the exception of one fish that came from the 1999 collection. The release locations were: 10 fish (five females and five males) above a waterfall on Christie Brook (site 4 in Figure 11), 90 fish (46 females and 44 males) at Black Rock Pool (site 3) and 89 fish (45 females and 44 males) released into the Lumber Mill Pool (site 1). Six of the fish released at each of the latter two sites were tagged with ultrasonic tags[1] so that the fish could be tracked within the watershed.

The movement of the ultrasonic-tagged fish in Salmon River, Colchester, was detected by stationary receivers (VR-2's[2]) that were located: (1) in the tidal section of the river -two receivers for redundancy; (2) just above tide in the lower-most exclusively freshwater pool; (3) at the upper and lower ends of the pools where the adults were released; (4) in the Salmon River branch upstream of the confluence with the Black River; and (5) in Black River about 2 km upstream of the confluence with Salmon River. Two other receivers were installed: one just below the first major tributary in North River, Colchester, a tidal tributary of Salmon River and one in the Cornwallis River. These latter two locations were chosen because it was not known whether the fish would leave the river and possibly migrate up a nearby tributary (e.g., North River) or possibly locate and home to the Cornwallis River, the river where the fish were being held through the smolting process and prior to release.

Eight additional fish, four males and four females, had dummy tags (ultrasonic tag shells weighted to equal the weight of the electronic tags) inserted in their abdomen and were held for spawning at Coldbrook to monitor tag retention. These fish were handled in a manner similar to that of the fish released into Salmon River and then artificially spawned by manually extruding the eggs or milt. One of the dummy-tagged fish died prior to spawning (a female) and the remainder after spawning. No tags were shed. The tags caused blockages in the vents of females that we attempted to spawn and manipulation was required to release most of the eggs. Blood was observed in the ovarian fluid of two females and in the milt of one of the males.

Although the study was not designed to determine the precise movement of fish, a portable receiver (VR-60) was used, on a limited scale, to search for fish outside of the detection

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[1] Ultrasonic tags were 58mm x 16mm, type V16-3H-R04K coded pingers from VEMCO Limited, 100 Osprey Drive, Shad Bay, N.S. B3T 2C1.
[2] VEMCO Limited, 100 Osprey Drive, Shad Bay, N.S. B3T 2C1.

limits of the fixed receivers. Two visits to the river were made with the portable gear but no fish were located. Two major storm events and an extended unusually-high-water period precluded river access or use of the portable gear at other times. Most fixed receivers were in place until the project was terminated due to weather conditions. Most receivers were removed over a four day period from December 14-17, with the exceptions of the receiver on the North River (removed on November 25 after being buried as a result of one of the storm events) and the two receivers at the pools where the fish were released (one removed on November 1 and one on November 29).

All 12 fish were detected in the river after release, although one fish (female) was detected only once at its release location, the Black Rock Pool. One fish (male) was detected for the last time at the tidal receivers on October 29, 11 days after release, and was assumed to have left Salmon River. A second fish (male) was detected for the last time at the tidal receivers on November 13. The remaining fish moved about within the river and were variably detected on one receiver or another. No fish were detected with the North River or Cornwallis River receivers. By the time the last receivers were removed from the river on December 17, only one of the remaining fish had been detected in the vicinity of the tidal or lowermost freshwater receivers.

Based on these data, the hypothesis that reconditioned, sexually-mature fish released near the time of spawning into a non-natal river will remain in the river through the spawning period cannot be rejected. However, the two extreme weather events could have permitted fish to leave the river undetected, because the ability of the receiver to detect the tagged fish is affected by turbulence and speed of movement of the fish. In spite of this possibility, some fish were still present in the river after those events, therefore if the high water conditions did influence emigration, not all fish left during those flood periods.

Adult releases and monitoring in 2003

In 2003, a total of 133 sexually-mature, reconditioned, adult salmon were released into Salmon River (weighing from 1.8-4 kg). These fish also originated as parr collected in the Stewiacke River in 1998 and 1999. On Oct. 15th, 57 fish were released at the Lumber Mill Pool (site 1 in Figure 11) and 58 fish were released just upstream at the Lumber Mill yard (site 2). Eighteen fish were released about 2 km upstream of the confluence of the Salmon and Black rivers (site 5) on October 30.

The adult survey in 2003 was to determine whether the adults remained in the river until late November and to see if spawning activity in the form of redd construction could be found. The survey was conducted on November 27, 2003, by two pairs of divers who swam (or walked where it was too shallow to swim) sections of the river (Table 13) looking for adult salmon and redds. If redds were found, eggs were to be excavated and transported back to the lab to confirm fertilization. The number and location of redds or fish was to be noted.

In total, 9.2 km of river was covered during the survey. The water was clear in most locations so visibility was not considered an impediment to seeing redds or fish. No

salmon, completed redds or evidence of spawning activity by salmon were found. Two partial carcasses were found that might have been salmon (only bits of flesh were observed and species identification was not confirmed) in the main river just downstream of Clifford Brook. Four areas were noted that may have been partial redds, but no eggs were found at these locations. Three of these spots were just downstream of the mouth of the Steele Run, and the fourth was in the main stem between Union and the mouth of Clifford Brook.

Several fish were also released into artificial spawning channels at the Mersey and Coldbrook biodiversity facilities to see if the captive fish would spawn successfully. Some of the fish were reconditioned and some were first-time spawners. All of the females released into the channels excavated redds and deposited their eggs. Two-thirds of the females in the trial were autopsied and found to have virtually none to a few eggs remaining in their body cavity. Males were also observed to participate in the spawning ritual at each site and pair with a female and release milt at the time of egg deposition.

Juvenile monitoring in 2003

Twelve sites, distributed throughout the watershed (Appendix 1), were electrofished on the Salmon River between July 21 and July 23, 2003, in an effort to find salmon fry that would be evidence of successful reproduction of the salmon released in 2002. All sites were sampled using a single pass with a two-person crew. A total effort of 5,448 seconds of shocking time was applied over 6,557 square meters of habitat during this survey. No salmon were captured during the survey, inferring that the fish released in 2002 did not successfully reproduce. The electrofishing evidence suggests few, if any, fish spawned in 2002, in spite of the tracking data which suggested at least a portion of the fish remained in the river past the spawning period.

The reason for the lack of evidence that the adult salmon released into Salmon River, Colchester, successfully spawned is unknown. The fish that were placed into spawning channels with selected mates performed mating rituals and deposited eggs. Also, a previous release of adult Big Salmon River fish, taken from a fish culture sea-cage to the river, was successful at producing juveniles (Amiro and Jefferson 1997). No progeny from the fish released into Salmon River in 2002 were found at the 12 sites surveyed by electrofishing, and no conclusive evidence of spawning by the fish released in 2003 was found during the adult and redd survey. However, although there was an abundance of relatively good quality habitat for spawning in the main river areas surveyed, there are many areas that were not examined, such as most tributary brooks. Additionally, there were several rain events between fish release and the survey in Salmon River which could have influenced the possibility of seeing a redd. Age-0 parr may not have been detected in the electrofishing surveys if they had not dispersed far from redd sites that may have existed elsewhere in the river system. An electrofishing survey in 2004 could potentially detect age-1 parr resulting from the 2002 releases, or age-0 parr resulting from the releases in 2003, thereby confirming or refuting the results presented here.

Evaluation of A lt Releases on the Little River, New Brunswick

In a project similar to that described in the previous section, a total of 53 sexually mature Atlantic salmon that had been previously spawned in captivity at the Mactaquac Biodiversity Facility) were released into Little River, Albert County, N.B., during the fall of 2002. This river is a tributary of the Petitcodiac River. Forty-two of these fish (30 females and 12 males) came from parr collected from the Big Salmon River in 1998. The remaining 11 fish (all males) came from the 1999 parr collection on the Big Salmon River. All fish were released at the John Hopper Road Pool (W 64.97942° N 45.93871°): 24 fish (16 females and 8 males) on October 18th, and the remaining 29 fish (14 females and 15 males) three days later. All but two of the salmon were externally marked with a large carlin tag.

An adult survey was completed in 2002 (similar to the Salmon River, NS, adult survey in 2003) to determine whether the adults remained in the river and to see if spawning activity, in the form of redd construction, could be found. Using two-person crews in canoes, the surveys were conducted on the Little and Pollett rivers on November 12, 2002 in an attempt to locate either salmon or salmon redds. In total, 67.5 km of river were covered during the survey. The water was clear in most locations so visibility was not considered an impediment to observing redds, but it may have been difficult to observe fish in the deeper pools. No salmon or completed redds were found, nor was there any evidence of spawning activity by salmon.

During 2003, four sites on each of the Little (sites Peti005-008) and Pollett (sites Peti001-004) rivers were electrofished in an effort to find salmon fry that could provide evidence of successful reproduction of the salmon released in 2002 (Appendix 1). All sites were sampled using a single pass with either a two or three-person crew. A total effort of 10,307 seconds of shocking time was applied over 5,190 square meters of habitat during this survey (Appendix 1). Eight fry were captured at two sites on the Pollett River during the electrofishing survey and none on the Little River. At present, it is unknown whether the fry captured on the Pollett River were progeny of the fish released in 2002 or were released as fry during the spring of 2003.

A similar project is being carried out by Parks Canada on the Point Wolfe River, NB, that may also provide an evaluation of the effectiveness of this release strategy.

Management Considerations

The inner Bay of Fundy salmon population is at a critically low level. During the 2003 assessment, declines in abundance of salmon of greater than 99% in the Stewiacke River (Gibson and Amiro 2003), and about 95% in the Big Salmon River (Gibson et al. 2003a) were documented. Evidence was also presented for similar declines in the other inner Bay of Fundy rivers (Gibson et al. 2003b). The declines appear to be ongoing in rivers without LGB support. The data collected during 2003 support these conclusions and no evidence was found for a change in this pattern. Both smolt production and marine survival remain very low and all adult recruitment is required for spawning. Special measures, such as the

LGB program, are required to prevent extirpation of iBoF salmon. Recovery of these stocks is not anticipated in less than three generations.

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Table 1. Summary statistics for the densities of Atlantic salmon parr (number per 100 m^2) estimated by electrofishing on inner Bay of Fundy rivers during 2003. "LGB" indicates whether (y) or not (n) the river has received captive-reared salmon since 2001. "N" is the number of electrofishing sites.

			Age-0					Age-1 and older				
River	LGB	N	mean	std. dev.	min	max	median	mean	std. dev.	min	max	median
Black River	n	3	0.49	0.43	0.00	0.81	0.66	10.28	14.39	1.61	26.89	2.32
Big Salmon River	y	12	28.10	48.10	0.00	130.75	0.14	17.12	22.22	0.52	57.31	5.19
Point Wolfe River	n	6	0.13	0.33	0.00	0.80	0.00	2.84	3.55	0.00	9.74	1.70
Upper Salmon River	n	6	0.00	0.00	0.00	0.00	0.00	0.22	0.53	0.00	1.31	0.00
Demoiselle Creek	y	3	0.00	0.00	0.00	0.00	0.00	7.36	8.88	0.00	17.23	4.85
Petitcodiac River	y	14	0.23	0.74	0.00	2.79	0.00	0.80	2.10	0.00	7.58	0.00
Memramcook River	n	8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Carters Brook	n	1	0.00		0.00	0.00	0.00	0.00		0.00	0.00	0.00
Economy River	n	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Portapique River	n	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Great Village River	n	2	0.00	0.00	0.00	0.00	0.00	0.11	0.15	0.00	0.21	0.11
Folly River	y	1	73.59		73.59	73.59	73.59	104.56		104.56	104.56	104.56
North River (Col.)	n	2	0.00	0.00	0.00	0.00	0.00	0.15	0.22	0.00	0.31	0.15
Salmon River (Col.)	n	12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stewiacke River	y	34	0.82	2.82	0.00	13.72	0.00	8.54	21.68	0.00	119.97	1.21
Gaspereau River	y	3	0.95	1.13	0.00	2.20	0.67	2.91	2.20	0.37	4.34	4.02

Table 2. Number of adipose clipped, non-adipose clipped and garment tagged smolts captured daily in the bypasses at the White Rock Generating Station on the Gaspereau River in 2002. A total of 1,500 garment tagged smolts were released upstream of the generating station on May 8, 2002. Adipose clipped smolts were captive-reared and released as age-0 parr in 2001. Non-adipose clipped smolts are wild origin fish.

	Number captured			
Date	Adipose clipped	Non-adipose clipped	Garment tagged	Total
08-May-02	0	3	3	6
09-May-02	3	0	12	15
10-May-02	9	0	20	29
11-May-02	18	16	119	153
12-May-02	12	1	21	34
13-May-02	27	8	44	79
14-May-02	33	16	66	115
15-May-02	36	10	60	106
16-May-02	36	29	34	99
17-May-02	29	6	19	54
18-May-02	36	15	40	91
19-May-02	36	12	25	73
20-May-02	15	12	12	39
21-May-02	38	14	19	71
22-May-02	54	9	12	75
23-May-02	111	23	43	177
24-May-02	61	8	9	78
25-May-02	60	9	10	79
26-May-02	26	2	3	31
27-May-02	22	2	6	30
28-May-02	18	4	6	28
29-May-02	12	6	5	23
30-May-02	11	5	6	22
31-May-02	42	6	6	54
01-Jun-02	1	3	3	7
02-Jun-02	2	0	3	5
Grand Totals:	**748**	**219**	**606**	**1,573**

Table 3. Number of adipose clipped, non-adipose clipped and garment tagged smolts captured daily in the bypasses at the White Rock Generating Station on the Gaspereau River in 2003. A total of 1,500 garment tagged smolts were released upstream of the generating station on May 9, 2003. Adipose clipped smolts were captive-reared and released as age-0 parr in 2000 or 2001. Non-adipose clipped smolts are wild origin fish.

	Number captured			
Date	Adipose clipped	Non-adipose clipped	Garment tagged	Total
08-May-03	15	8	0	23
09-May-03	20	9	0	29
10-May-03	36	7	17	60
11-May-03	116	8	83	207
12-May-03	18	0	15	33
13-May-03	31	3	23	57
14-May-03	77	5	51	133
15-May-03	41	1	22	64
16-May-03	89	9	45	143
17-May-03	197	21	73	291
18-May-03	31	5	13	49
19-May-03	52	9	17	78
20-May-03	48	14	8	70
21-May-03	90	14	11	115
22-May-03	245	33	45	323
23-May-03	131	12	13	156
24-May-03	48	4	3	55
25-May-03	45	1	0	46
26-May-03	61	4	0	65
27-May-03	56	2	1	59
28-May-03	24	1	0	25
29-May-03	27	3	0	30
30-May-03	15	1	1	17
31-May-03	41	6	4	51
01-Jun-03	41	0	1	42
02-Jun-03	6	0	0	6
03-Jun-03	9	0	0	9
04-Jun-03	2	0	0	2
05-Jun-03	6	0	0	6
06-Jun-03	10	0	0	10
Totals	**1,628**	**180**	**446**	**2,254**

Table 4. Summary of the adult Atlantic salmon counts at the White Rock fish ladder on the Gaspereau River, NS, from 1997 to 2003.

			Year						
	Origin	Size	1997	1998	1999	2000	2001	2002	2003
Released into river:	Wild	Large	5	6	11	3	6	0	0
		Small	30	9	1	7	7	0	0
	Hatchery	Large	2	10	13	4	10	0	0
		Small	22	42	0	30	5	0	0
Retained for broodstock:	Wild	Large	7	3	14	4	14	0	2
		Small	23	7	2	14	6	8	2
	Hatchery	Large	5	2	0	9	3	4	0
		Small	8	20	0	5	6	2	3
Total count:		Large	19	21	38	20	33	4	2
		Small	83	78	3	56	24	10	5
Total count all sizes:			102	99	41	76	57	14	7
%		counted	74	56	30	16	24	8	5
Conservation		escapement	43	42	15	9	18	0	0

Table 5. Biological characteristics of adult Atlantic salmon sampled in the Gaspereau River, NS, and Big Salmon River, NB, during 2003. Ages are given as FW.SW.PS, where FW is the age at smoltification, SW is the number of years (winters) since smoltification and PS is the number of previous spawnings. na = not available.

River	Capture date	Origin	Sex	Fork length (cm)	Age
Gaspereau River	11 Jun	Wild	Female	74.0	2.2.0
	7 Jul	Hatchery	Female	50.0	na
	11 Jul	Hatchery	Male	50.8	1.1.0
	28 Jul	Wild	Female	69.8	3.2.0
	28 Jul	Wild	Female	53.3	3.1.0
	5 Aug	Wild	Male	55.0	na.1.0
	6 Aug	Hatchery	Male	47.7	1.1.0
Big Salmon River	9 Sept	Wild	Male	61.5	
	9 Sept	Hatchery	Male	53.7	
	9 Sept	Wild	Female	65.7	2.2.1
	9 Sept	Wild	Male	50.0	3.1.0
	9 Sept	Wild	Male	56.5	na.1.0
	9 Sept	Wild	Female	55.0	3.1.0
	9 Sept	Wild	Female	55.2	3.1.0

Table 6. Daily summary of the number of smolt captured, released upriver (marked smolts only) and the number of marked smolt recaptured using a rotary screw trap in the Big Salmon River, NB, in 2003. Smolt categories are: "n-ac" = "non-adipose clipped" which includes wild origin smolts and smolts originating from the Live Gene Bank (LGB) that were released as fry, "ff" = "fall-fingerling" which are smolt originating from the LGB that were released as fall fingerlings and "ss" which are fish originating from the LGB that were released as smolt during the spring. Blank cells are "zeros" unless noted otherwise.

		Catch (unmarked fish)			Marked releases			Marked recaptures		
Month	Day	n-ac	ff	ss	n-ac	ff	ss	n-ac	ff	ss
5	06			Trap installed						
5	07									
5	08	7	1							
5	09	5	6		4	4				
5	10	2	1		1	1		1		
5	11									
5	12									
5	13	1								
5	14	1					534			
5	15									4
5	16	1								
5	17	1								
5	18	13	1		11	1				1
5	19	21	3		17	3				1
5	20	12	6		9	6		1		
5	21	74	41	1	58	39	500	2		2
5	22	24	12		19	12		4		4
5	23	46	27	8	37	26		4	2	11
5	24	47	27	18	37	23		4	4	6
5	25	55	31	43	44	31		1		3
5	26	233	61	141	185	60		19	7	1
5	27	37	12	7	28	12	492	5	3	
5	28	45	14	7	35	14		6	2	5
5	29	58	19	27	47	19		5	3	7
5	30	21	13	29	16	13		3		2
5	31	61	15	29	49	15		2		4
6	01	80	41	34	63	41		10	1	2
6	02	137	74	85	111	73	490	14	4	4
6	03	38	21	17	31	19		5	5	15
6	04	18	7	14	15	6		5		8
6	05	5	2		4	2		2		2
6	06	5	8	2	4	8		2		2
6	07	14	10	14	12	9		2	1	2
6	08	2	2	10	1	2		1		
6	09	4	2	4	3	2				
6	10		1	2						
6	11									
6	12			2						
6	13								1	
6	14				Trap not checked					
6	15									
6	16	1								
6	17	2		2				Trap removed		
Totals:		1,071	458	496	841	441	2,016	98	33	86

Table 7. Summary statistics for the age, length and weight for Atlantic salmon smolts captured with a rotary screw trap in the Big Salmon River, NB during 2003.

Origin / Statistic	Age-1	Age-2	Age-3	Age-4	Unknown
non-adipose clipped:					
sample size		194	23	2	1
mean (s.d.) fork length (cm)		14.8 (1.10)	15.7 (1.25)	17.9 (0.57)	14.0
mean (s.d.) weight (g)		32.6 (7.66)	37.3 (9.72)	56.5 (2.12)	23.5
LGB fall fingerlings (clipped):					
sample size	90	21			2
mean (s.d.) fork length (cm)	13.7 (1.02)	14.4 (0.88)			14.4
mean (s.d.) weight (g)	23.8 (5.75)	28.6 (5.56)			29.6

Table 8. Recapture rates of tagged Atlantic salmon smolts, by origin, in the Big Salmon River in 2003. Non-adipose clipped smolts are the result of either spawning in the wild or are LGB progeny that were released as fry.

Origin	Tag type	Number released	Number recaptured	Recapture rate (%)
non-adipose clipped	streamer (clear)	841	98	11.7
LGB fall fingerlings	streamer (clear)	441	33	7.5
combined		1,282	131	10.2
LGB smolts	garment (clear)	534	16	3.0
	garment (green)	500	21	4.2
	garment (red)	492	21	4.3
	garment (blue)	490	28	5.7
combined		2,016	86	4.3

Table 9. Summary of the number of salmonids observed during diver counts on the Big Salmon River in 2003. Small salmon are <63 cm fork length. "na" means not available. Most or all captive-reared salmon that would be returning to Big Salmon River in 2003 would have been adipose clipped prior to release (aquaculture fish would be an exception). River sections are shown in Figure 8.

		Atlantic salmon					
	River	Adipose clipped		Not adipose clipped		Rainbow	Brook
Date	section	small	large	small	large	trout	trout
July 29 - 30	lower	1	0	8	1	10	na
	upper	0	0	0	0	0	na
Sept. 8 - 9	lower	1	0	11	1	13	7
	upper	0	0	2	0	0	0
Oct. 2	lower	0	0	7	0	2	0
	middle	0	0	0	0	0	3
	upper	1	0	2	2	0	0

Table 10. The number of fish by life stage that were released into iBoF rivers as part of the iBoF salmon Live Gene Bank Program from 2001 to 2003.

		Number of fish					
		Life stage*					
Year	River	Unfed fry	6 week fry	Age-0 parr	Age-1 parr	Smolt	Adult
2001	Big Salmon	185,523		77,718			
	Demoiselle	16,222					
	Stewiacke	12,722	29,484	34,083			
	Gaspereau			42,694		10,860	
2001 Total		214,467	29,484	154,495		10,860	
2002	Big Salmon	138,682		34,062		19,725	
	Demoiselle	10,080				1,078	
	Petitcodiac	56,159					53
	Folly/Debert	42,000	54,000	70,080			
	Chiganois	24,000	27,000	37,081			
	Salmon (Col. Co.)						190
	Stewiacke	24,000	42,000	88,328		6,040	
	Gaspereau		7,393			16,508	
2002 Total		294,921	130,393	229,551		43,351	243
2003	Big Salmon	296,818		54,000	21,025	13,647	15
	Point Wolfe						286
	Petitcodiac						550
	Folly/Debert	59,496	69,000	91,578			
	Chiganois	42,605	46,500	32,920			
	Salmon (Col. Co.)						133
	Stewiacke	34,750		27,000		16,797	
	Gaspereau			21,726	18,600	27,422	
2003 Total		433,669	115,500	227,224	39,625	57,866	984

* unfed fry - first two weeks after absorption of the yolk sac
6 week fry - 2 to 8 weeks after absorption of the yolk sac
Age-0 parr - 20 to 26 weeks after absorption of the yolk sac
Age-1 parr - 1 to 2 years from date of hatch
Smolts - either 1 or 2 years date of hatch
Adults - fish that are sexually mature after smoltification

Table 11. The number of salmon by life stage collected in the wild and entered into the inner Bay of Fundy Live Gene Bank in 2003.

	Number of fish			
	Life stage			
River	Fry	Parr	Smolt	Adult
Big Salmon		442	216	
Upper Salmon River			101	
Stewiacke	18	10		
Gaspereau		37	52	7
Total	18	489	369	7

Table 12. The number of fish by life stage held in captivity as part of the iBoF salmon Live Gene Bank Program as of December 2003.

Province	Life stage			
River of origin	Egg	Parr	Post-smolt	Adult
Nova Scotia:				
Gaspereau	73,000	12,000	52	67
Stewiacke	477,000	51,000	180	547
Great Village				48
Economy				34
Harrington			202	
Portapique				7
Folly				1
Debert				2
mixed Minas Basin				13
New Brunswick:				
Big Salmon	1,100,000	24,000	970	742
Black	100,000			142
Upper Salmon			96	

Table 13. River sections included in the 2003 adult salmon and redd survey in the Salmon River, Colchester Co., Nova Scotia.

Section number	Description	Location (military grid)		Length (km)
		Start	End	
1	Main stem from Clifford Brook to bridge at Valley Station	11E/6 864-265	11E/6 846-254	2.1
2	Main stem below mill yard at Valley Station through pool where fish were released and run below pool	11E/6 843-247	11E/6 843-242	0.4
3	Main stem from Union to Clifford Brook (where section 1 began)	11E/6 903-270	11E/6 864-265 + 0.3 km of Clifford Bk.	3.4
4	Pools at bridge on main branch about 2km above confluence with Black River, and pools at lowermost bridge on Black River and at the lower end of Cavalry River	Pools at bridge at 11/E6 937-303	Pools at 11E/6 963-298	1
5	Main stem between the Highway 104 bridge and the second bridge upstream	11E/6 946-363	11E/6 943-343	2.3

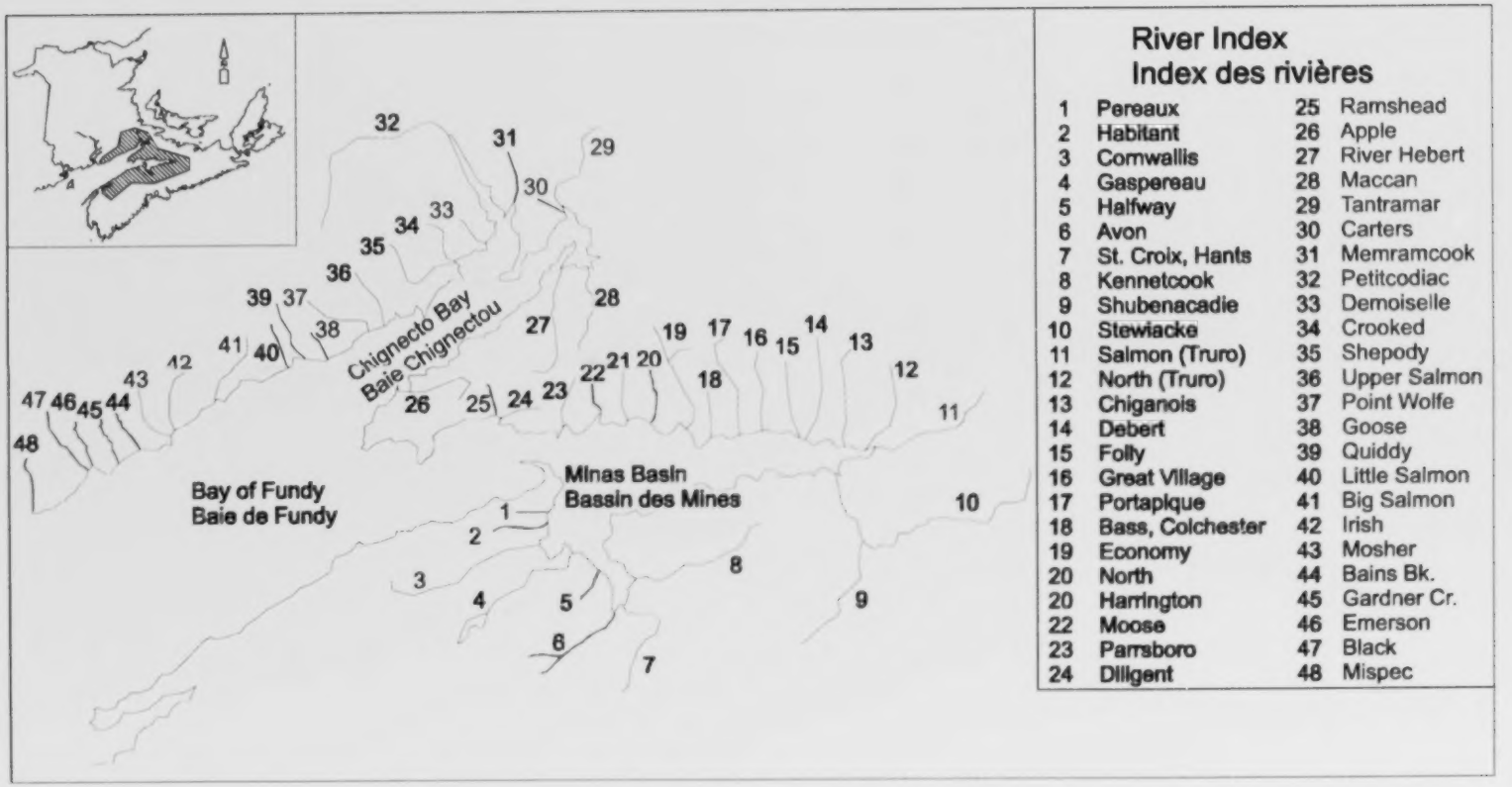

Figure 1. Map showing the locations of inner Bay of Fundy rivers mentioned in this report.

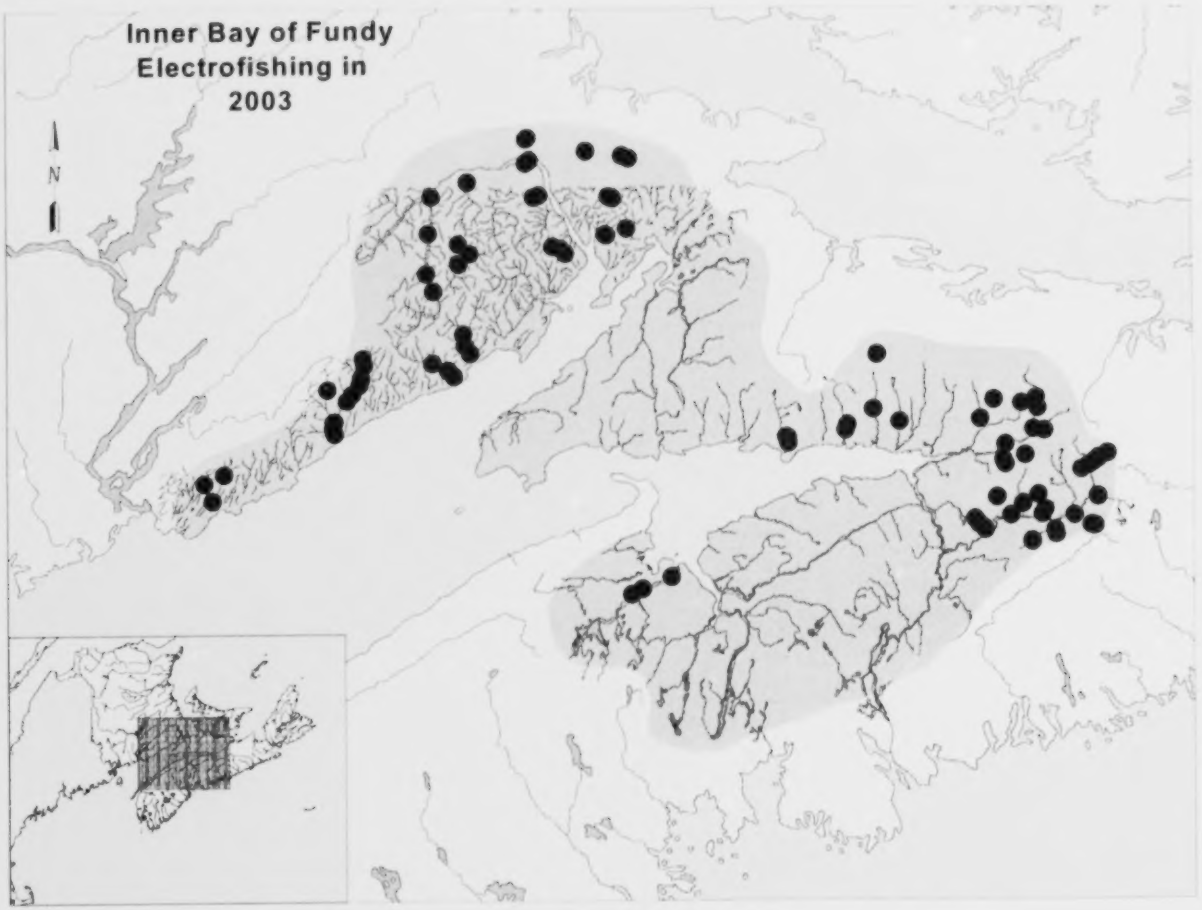

Figure 2. Locations of sites on Inner Bay of Fundy rivers that were electrofished during 2003.

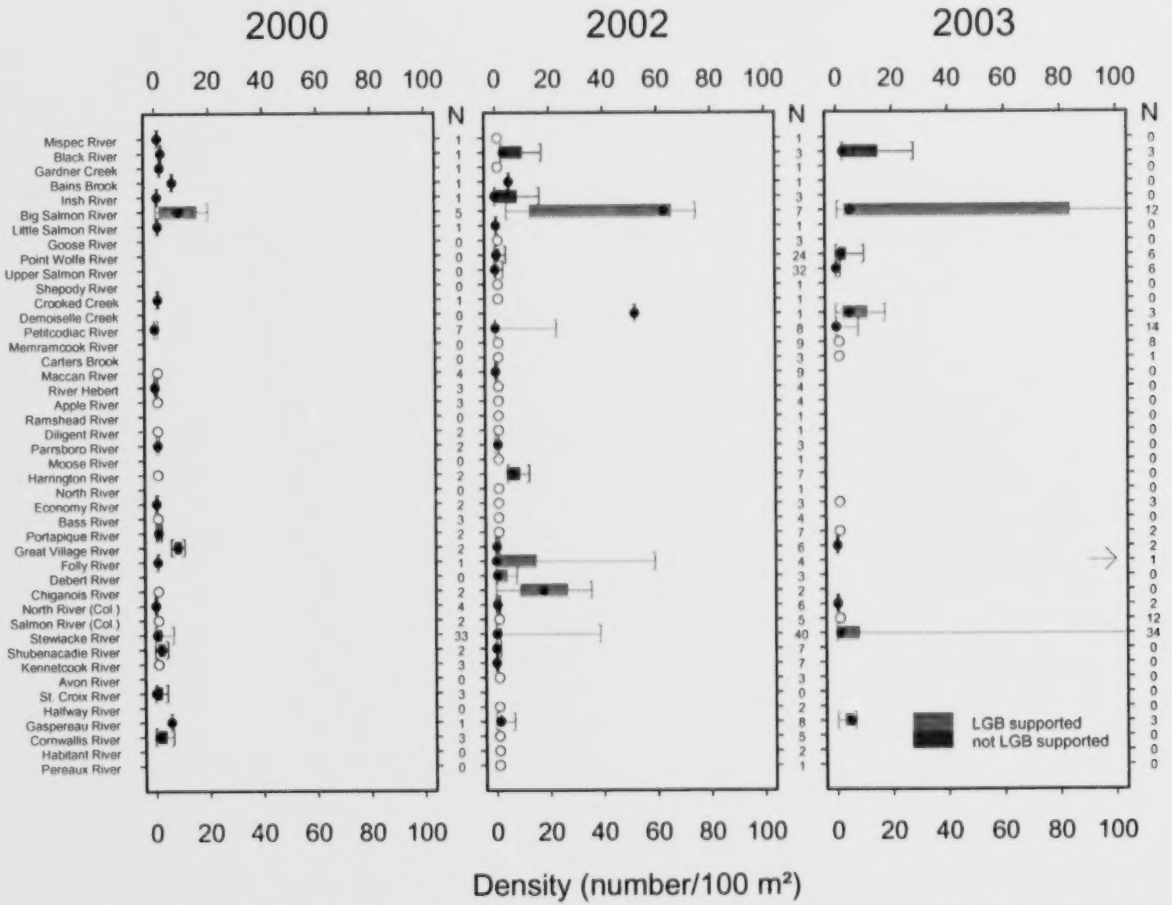

Figure 3. Box plots showing the density of Atlantic salmon in inner Bay of Fundy rivers based on electrofishing during 2000, 2002 and 2003. The dot shows the median density (hollow dots indicate no salmon were captured) and the box shows the inter-quartile spread. The whiskers are drawn to the minimum and maximum. LGB supported are rivers into which juvenile Atlantic salmon have been released since 1996. "N" is the number of electrofishing sites. Densities outside the range of the graph (shown with arrows or whiskers extending off the right side of the graph) are available in Table 1.

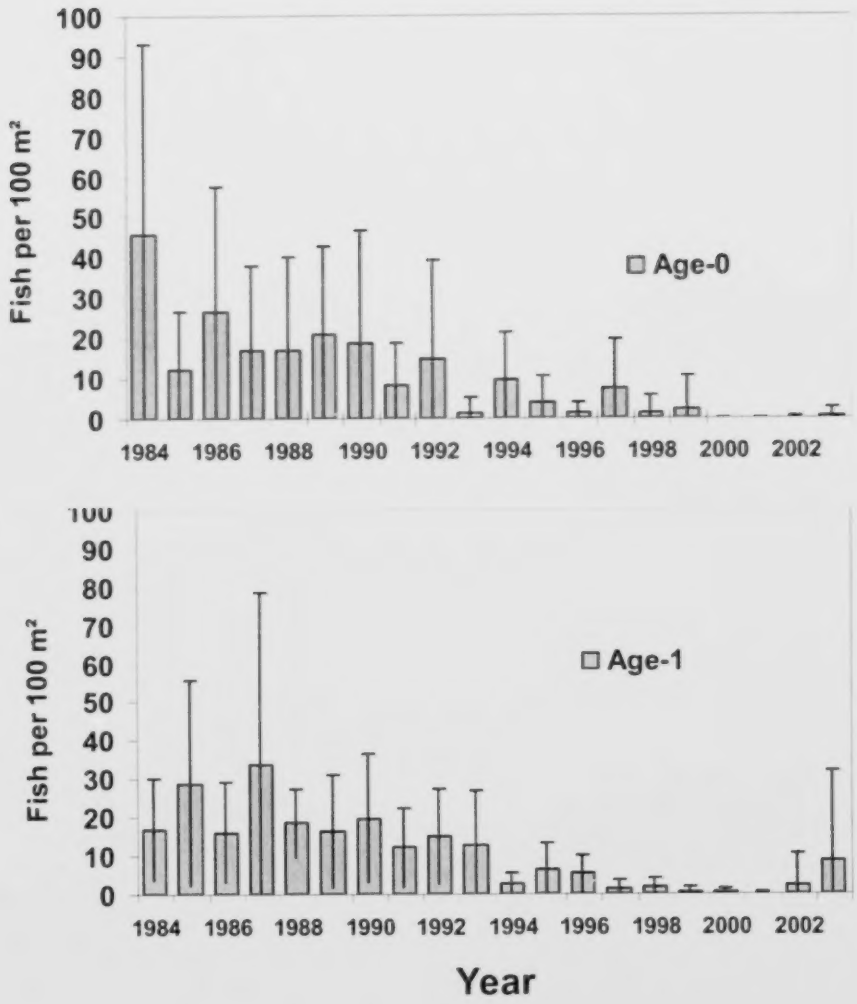

Figure 4. Mean densities of juvenile Atlantic salmon in the Stewiacke River from 1984 to 2003. Error bars are +/- one standard deviation.

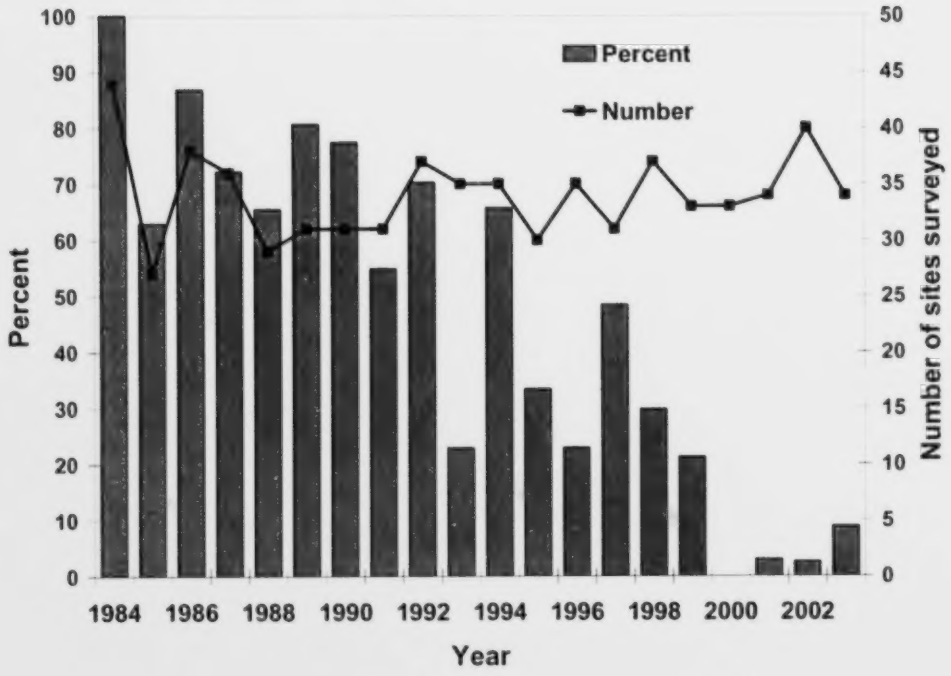

Figure 5. Percentage of sites electrofished annually on the Stewiacke River, NS, that contained age-0 parr. The line shows the number of sites that were surveyed.

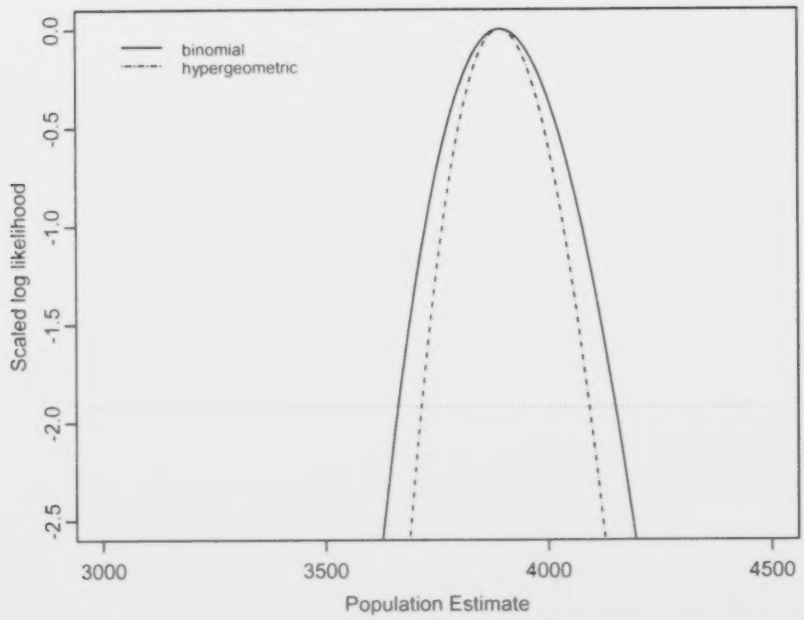

Figure 6. Log likelihoods for the number of smolt migrating past the White Rock Generating Station on the Gaspereau River in 2002. Data are from a single census mark-recapture experiment with 1,500 marked fish, 1,573 fish sampled for marks and 606 marked fish in the sample. Likelihoods are standardized by subtracting the maximum log likelihood from each value. The intersections between the profile likelihoods and horizontal line show the 95% confidence interval for the population size. Log likelihoods were calculated assuming binomial and hypergeometric distributions for random sampling errors.

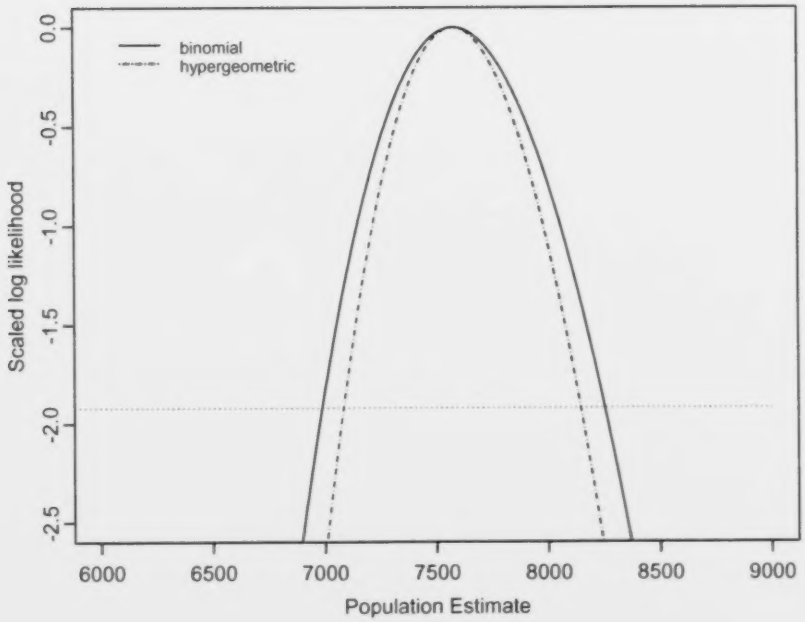

Figure 7. Log likelihoods for the number of smolt migrating past the White Rock Generating Station on the Gaspereau River in 2003. Data are from a single census mark-recapture experiment with 1,500 marked fish, 2,254 fish sampled for marks and 446 marked fish in the sample. Likelihoods are standardized by subtracting the maximum log likelihood from each value. The intersections between the profile likelihoods and horizontal line show the 95% confidence interval for the population size. Log likelihoods were calculated assuming binomial and hypergeometric distributions for random sampling errors.

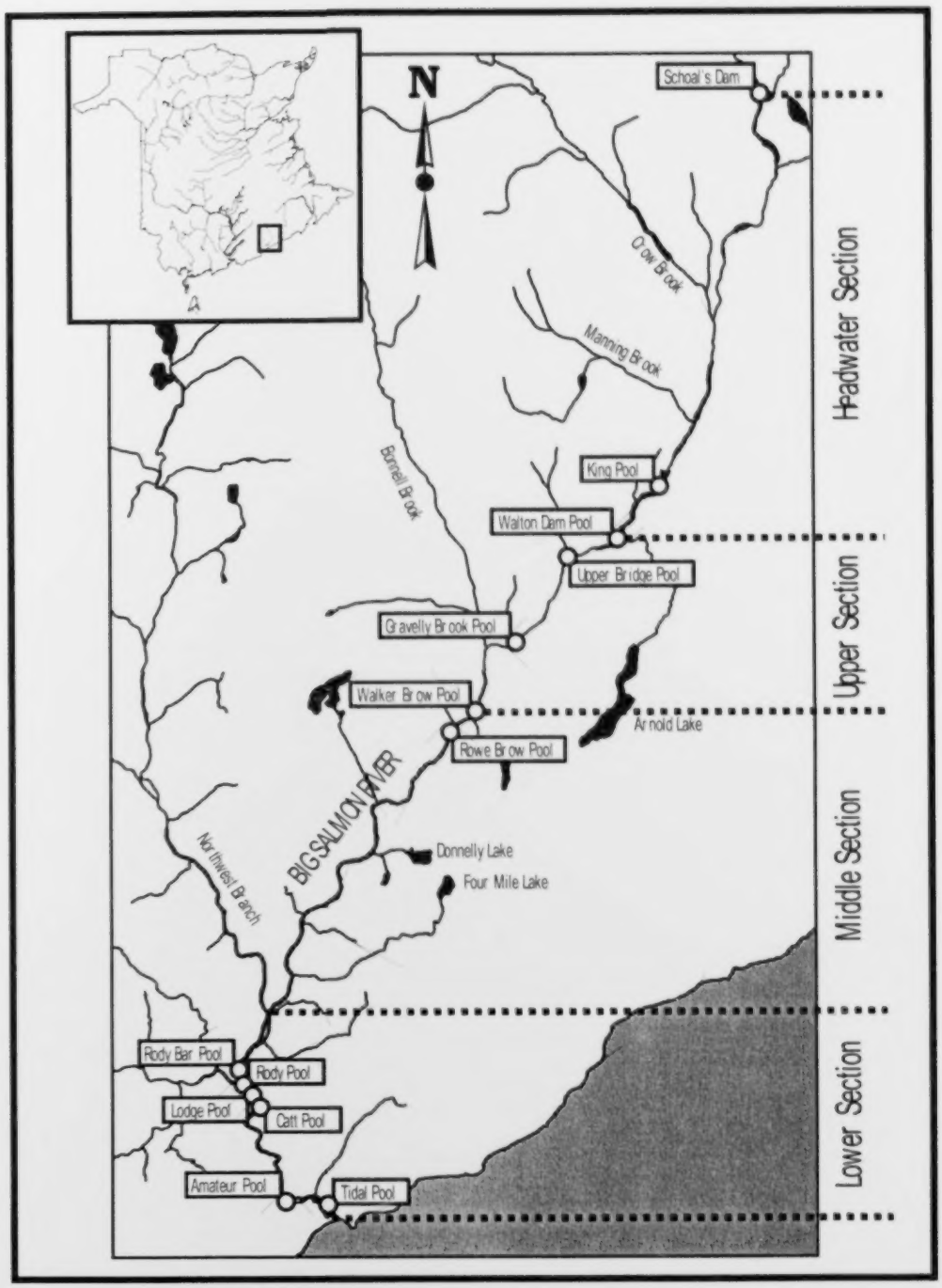

Figure 8. A map of the Big Salmon River, NB, showing the sections of the river used in the adult dive counts. The upper, middle and lower sections were included in the 2003 survey.

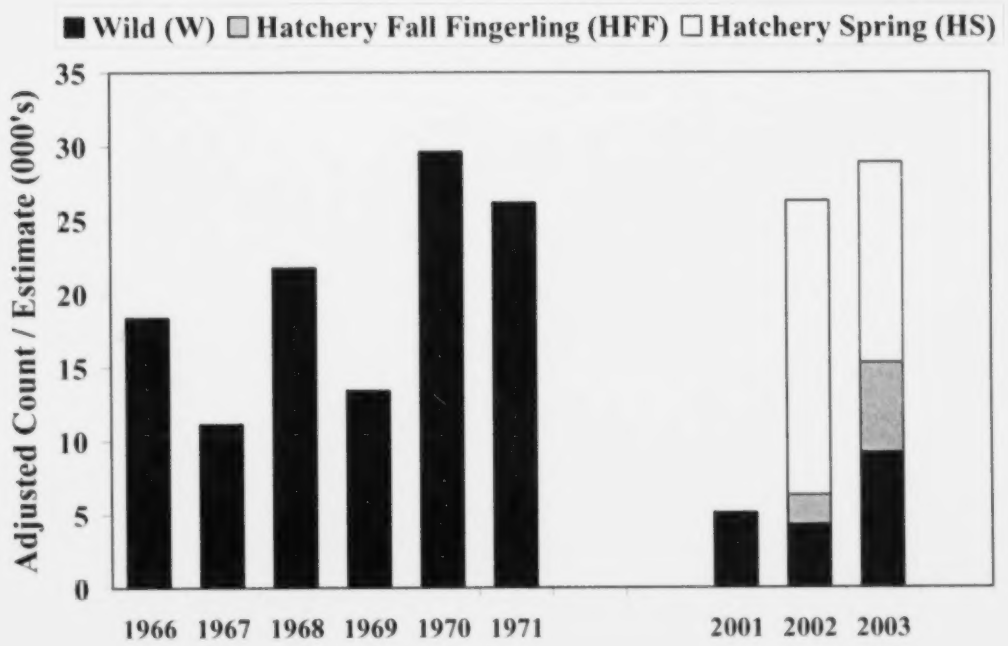

Figure 9. Estimates of the number of smolts emigrating from Big Salmon River, NB from 1966 to 1971, and from 2001 to 2003. The counts from 1966 to 1971 are fence counts adjusted for capture efficiency taken from Jessop (1975). The 2001 to 2003 estimates are obtained by mark-recapture as described in the text. A proportion of the wild smolt captured from 1967-69 may have been unmarked captive reared fish released into the Big Salmon River from 1966 to 1967. A portion of the wild smolt captured in 2003 may have been released as unmarked fry during 2001.

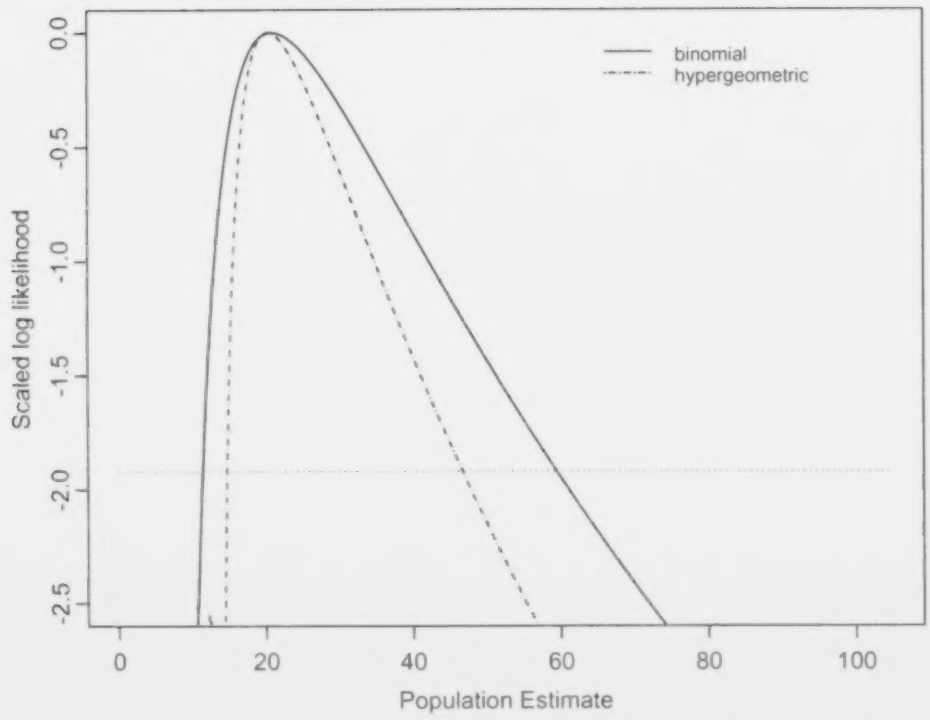

Figure 10. Likelihoods for the number of adult fish returning to Big Salmon River, NB, in 2003. Data are from a single census mark-recapture experiment with 7 marked fish, 12 fish sampled for marks and 4 marked fish in the sample. Likelihoods are standardized by subtracting the maximum log likelihood from each value. The intersections between the profile likelihoods and horizontal line show the 95% confidence interval for the population size. Profile likelihoods were calculated assuming binomial and hypergeometric distributions for random sampling errors.

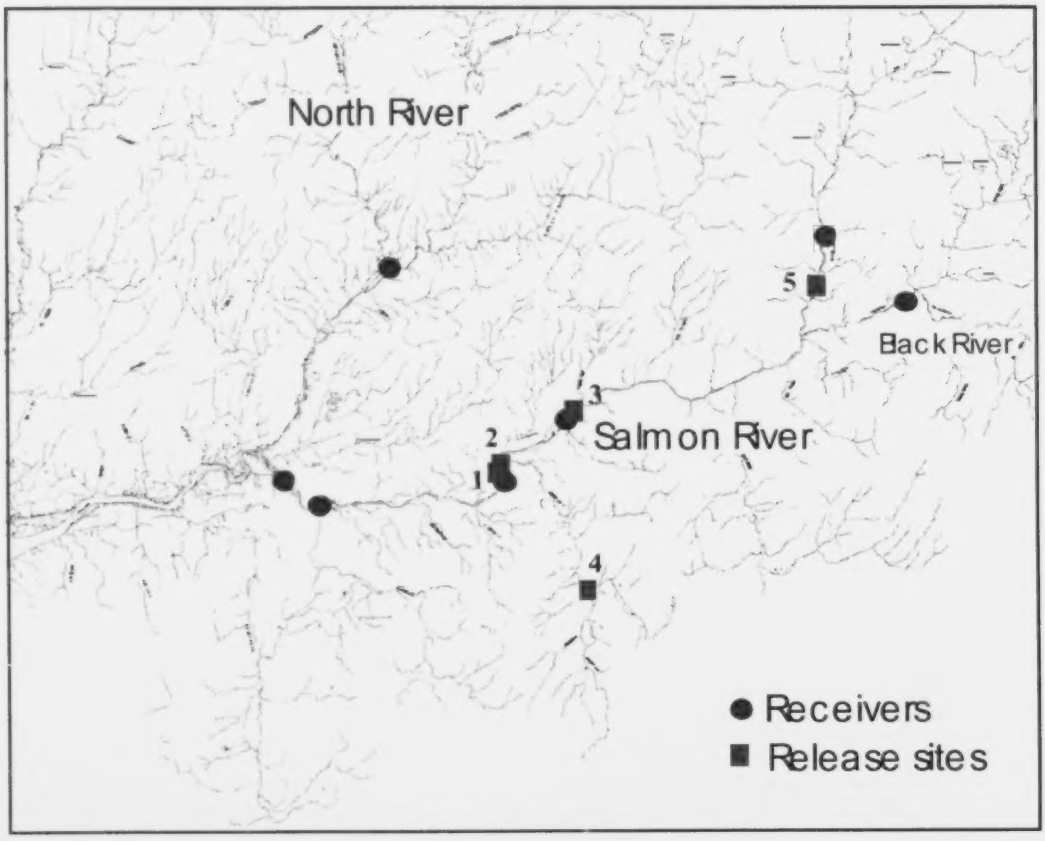

Figure 11. Map of the Salmon River, Colchester Co., showing the location of the adult salmon releases in 2002 and 2003 and the location of receivers to detect the movement of the fish within the watershed (2002 only). During 2002, 89 adult salmon were released at site 1, 90 were released at site 3 and 10 adult salmon were released at site 4. During 2003, 57 adult salmon were released at site 1, 58 were released at site 2 and 18 adult salmon were released at site 5.

Appendix 1. Summary of electrofishing surveys on inner Bay of Fundy rivers during 2003. Site ID's correspond with the Diadromous Fish Division (DFD) electrofishing database. The catch is the number of fish captured on the first pass of the survey. Organization codes are: "DFD BIO" = DFO Diadromous Fish Division, Maritime Region, Bedford Institute of Oceanography location,"DFD MON" = DFO Diadromous Fish Division, Maritime Region, Moncton location, "FNP PC" = Parks Canada (Fundy National Park) and "FFFN" = Fort Folly First Nation. Other species include: yellow perch, sea lamprey, Atlantic tomcod, slimy sculpin and 37 unidentified specimens.

									Catch									
River	Site ID	Latitude	Longitude	Organization	Area (m^2)	Month	Day	Shocking time (s)	Atlantic salmon	American eel	brook trout	brown trout	rainbow trout	white sucker	blacknose dace	chub spp.	other cyprinids	stickleback spp.	others
Big Salmon	BSR001	45.4231	65.4110	DFD MON	378	8	26	912	2	2									
Big Salmon	BSR002	45.5007	65.3699	DFD MON	228	8	26	685	6	2					3				
Big Salmon	BSR003	45.5549	65.3228	DFD MON	227	8	27	1002	8	11					138				
Big Salmon	BSR004	45.5839	65.3116	DFD MON	289	8	25	1613	107	9					73				
Big Salmon	BSR005	45.5989	65.3160	DFD MON	429	9	3	2839	319						30				
Big Salmon	BSR006	45.5268	65.4353	DFD MON	205	8	28	1272	151										
Big Salmon	BSR007	45.5378	65.3283	DFD MON	207	8	27	1475	73	3					43				
Big Salmon	BSR023	45.4365	65.4166	DFD MON	890	8	20	1037	2	1	1				7				
Big Salmon	BSR024	45.4516	65.4118	DFD MON		8	25	1195	9	4					11	1			
Big Salmon	BSR025	45.4504	65.4145	DFD MON	823	8	25	1145	3		7				3				
Big Salmon	BSR026	45.5160	65.3526	DFD MON	443	8	26	971	8	10					12				
Big Salmon	BSR027	45.5510	65.3222	DFD MON	456	8	26	896	7	15	2				77	2			
Black	Blk001	45.3294	65.7811	DFD MON	302	8	18	1232	3	3	4						9		
Black	Blk002	45.3086	65.8470	DFD MON	356	8	19	770	42		3						23		
Black	Blk003	45.2679	65.8200	DFD MON		8	19	1077	6		14						93		
Carters Br.	Cart003	45.9007	64.4324	FFFN	167	7	3	383			10								
Demoiselle Cr.	Demo001	45.8592	64.6793	DFD MON	312	8	6	1072	23		17								
Demoiselle Cr.	Demo005	45.8433	64.6378	DFD MON	507	8	7	660		1	10								
Demoiselle Cr.	Demo006	45.8543	64.6537	DFD MON	385	8	6	600	8	4	5								
Economy	Econ001	45.3985	63.8961	DFD BIO	1032	8	21	449		6						3			
Economy	Econ002	45.4105	63.8974	DFD BIO	1502	8	21	787		27	3			2		25			
Economy	Econ003	45.4134	63.9032	DFD BIO	890	8	21	517		14	2			1		16			
Folly	Foll004	45.4476	63.5258	DFD BIO	626	8	7	2299		5	2				14				
Gaspereau	Gasp005	45.0861	64.2887	DFD BIO	625	10	10	567	477	26				3	139				

Appendix 1 (continued).

River	Site ID	Latitude	Longitude	Organization	Area (m^2)	Month	Day	Shocking time (s)	Catch										
									Atlantic salmon	American eel	brook trout	brown trout	rainbow trout	white sucker	blacknose dace	chub spp.	other cyprinids	stickleback spp.	others
Gaspereau	Gasp006	45.0457	64.4207	DFD BIO	3080	10	10		82										
Gaspereau	Gasp010	45.0584	64.3854	DFD BIO	700	10	10	852	15										
Great Village	GrVi005	45.6050	63.6003	DFD BIO	1360	8	1	975		24	9				332	1			
Great Village	GrVi006	45.4769	63.6133	DFD BIO	2184	8	11	683	2	4	11				29				
Memramcook	Mem001	46.0712	64.4476	FFFN	228	7	10	304		3	1							1	23
Memramcook	Mem008	45.8855	64.5000	FFFN		7	3	89		8	11			12					
Memramcook	Mem010	46.0818	64.5679	FFFN	495	7	10	477		2				2			16		
Memramcook	Mem011	46.0648	64.4249	FFFN	270	7	10	450		7									8
Memramcook	Mem014	45.8869	64.5039	FFFN		7	3	666		7	9								
Memramcook	Mem015	45.9758	64.4936	FFFN	250	7	2	21		2	7			1					
Memramcook	Mem016	45.9743	64.4898	FFFN	335	7	2	539		1	4								
Memramcook	Mem017	45.9714	64.4781	FFFN	467	7	2	673		2	15								
North (Col)	NorTr006	45.4977	63.2126	DFD BIO	763	7	30	1122	1	127	3		1	105	237	1			
North (Col)	NorTr007	45.4531	63.2576	DFD BIO	1303	7	30	1473		16				1	79				
Petitcodiac	Peti001	45.9755	65.0859	DFD MON	656	8	13	1111	3	11				1	100		13		
Petitcodiac	Peti002	45.8902	65.0960	DFD MON	607	8	13	1417		10					83		2		1
Petitcodiac	Peti003	45.7963	65.1027	DFD MON	670	8	12	2214	14	10				1	104		4		
Petitcodiac	Peti004	45.7555	65.0795	DFD MON	782	8	12	1488	19		4				49				
Petitcodiac	Peti005	45.8190	64.9955	DFD MON	551	8	11	1411		10	1			5	49		44		17
Petitcodiac	Peti006	45.8428	64.9577	DFD MON	371	8	11	927		3	23			2	24		46		134
Petitcodiac	Peti007	45.8654	64.9953	DFD MON	919	8	8	1148		8					82		18		4
Petitcodiac	Peti008	46.0099	64.9645	DFD MON	509	8	7	591		5					3		22		3
Petitcodiac	Peti010	45.9792	64.7256	FFFN	895	7	14	922		1	68								
Petitcodiac	Peti011	45.9744	64.7433	FFFN	234	7	14	389			17								
Petitcodiac	Peti012	46.1103	64.7681	FFFN	387	7	3	576		25				21		31	8	7	1
Petitcodiac	Peti013	46.1130	64.7634	FFFN	193	7	29			1				29					
Petitcodiac	Peti014	46.0607	64.7573	FFFN	251	7	29	619		15				15		11			
Petitcodiac	Peti015	46.0543	64.7699	FFFN	774	7	30	916		2				27		93	46		5
Point Wolfe	PWR001	45.5564	65.0129	FNP PC	303	8	28			2	1								

Appendix 1 (continued).

River	Site ID	Latitude	Longitude	Organization	Area (m^2)	Month	Day	Shocking Time (s)	Catch											
									Atlantic salmon	American eel	brook trout	brown trout	rainbow trout	white sucker	blacknose dace	chub spp.	other cyprinids	stickleback spp.	others	
Point Wolfe	PWR002	45.5577	65.0136	FNP PC	343	8	29		1	7	2									
Point Wolfe	PWR003	45.5707	65.0321	FNP PC	271	9	3		2	4	3									
Point Wolfe	PWR004	45.5874	65.0828	FNP PC	120	9	10		5	5										
Point Wolfe	PWR005	45.5872	65.0841	FNP PC	291	9	11		5	4	1									
Point Wolfe	PWR006	45.5701	65.0309	FNP PC	278	9	2		2	1	4									
Portapique	Port006	45.4283	63.7055	DFD BIO		7	31	926		20	6				4					
Portapique	Port008	45.4407	63.6994	DFD BIO	755	7	31	994		13	18				34					
Salmon (Col)	SalTr002	45.3677	63.1082	DFD BIO	357	7	21	332		3	14			1	12		1			
Salmon (Col)	SalTr004	45.4284	63.0813	DFD BIO	507	7	22	414		13					7					
Salmon (Col)	SalTr005	45.5013	63.0718	DFD BIO	565	7	23	550		9				8	53	1				
Salmon (Col)	SalTr008	45.4767	63.0674	DFD BIO	338	7	22	382		8				4	18					
Salmon (Col)	SalTr009	45.4770	63.0665	DFD BIO	115	7	23	202		3	3			2	16					
Salmon (Col)	SalTr010	45.3464	63.1739	DFD BIO	424	7	21	402		1	13				35					
Salmon (Col)	SalTr011	45.3570	63.8124	DFD BIO	376	7	21	308		1	7				20					
Salmon (Col)	SalTr012	45.4894	63.1203	DFD BIO	1079	7	21	638		8					22		1			
Salmon (Col)	SalTr013	45.3931	63.1744	DFD BIO	973	7	22	857		15				3	50		1			
Salmon (Col)	SalTr014	45.3931	63.1744	DFD BIO	1149	7	22	644		13				4	38					
Salmon (Col)	SalTr015	45.4249	63.0452	DFD BIO	244	7	22	317		7				4	27	6	5			
Salmon (Col)	SalTr016	45.4282	63.0804	DFD BIO	428	7	22	402		4					9					
Stewiacke	STEW1.1	45.3704	62.8370	DFD BIO	286	7	24	590	2	7	9			16		50				
Stewiacke	STEW1.2	45.3709	62.8352	DFD BIO	385	7	24	447	3		5	1		1		17				
Stewiacke	STEW13.3	45.3337	62.9217	DFD BIO		7	24	921	36		11			4						
Stewiacke	STEW15.1	45.2019	62.8786	DFD BIO	997	7	21	1706	58	11	42	4								
Stewiacke	STEW15.2	45.2021	62.8773	DFD BIO	554	7	21	1740	60	15	40	3								
Stewiacke	STEW18.1	45.2694	63.2027	DFD BIO	291	7	8	1074		5	56			3					1	1
Stewiacke	STEW18.2	45.2700	63.2018	DFD BIO	378	7	8	1384		17	85			28		3			1	
Stewiacke	STEW19.1	45.2746	63.0657	DFD BIO	256	7	9			8	18			1		8				
Stewiacke	STEW19.2	45.2750	63.0651	DFD BIO	182	7	9	539		4	42	1		5		3				
Stewiacke	STEW23.0	45.3511	62.8802	DFD BIO	870	7	22	1250	8	17	9			1		21				1

Appendix 1 (con't).

River	Site ID	Latitude	Longitude	Organization	Area (m^2)	Month	Day	Shocking Time (s)	Catch										
									Atlantic salmon	American eel	brook trout	brown trout	rainbow trout	white sucker	blacknose dace	chub spp.	other cyprinids	stickleback spp.	others
Stewiacke	STEW27.1	45.1943	63.2418	DFD BIO	1072	7	10	2063		80				1		0			11
Stewiacke	STEW27.4	45.1971	63.2434	DFD BIO	832	7	10	1508		68						0			
Stewiacke	STEW29.1	45.2275	63.1562	DFD BIO	243	7	8	1903	135	7	24	2				3		1	
Stewiacke	STEW30.2	45.2548	63.1160	DFD BIO		7	29	1497	6	32	8	1		20		44			1
Stewiacke	STEW30.3	45.2555	63.1155	DFD BIO		7	29	1175	4	38	5			24		1			
Stewiacke	STEW31.1	45.1659	63.0857	DFD BIO		7	29	1242	5	1	15			1		1			
Stewiacke	STEW31.1	45.1659	63.0857	DFD BIO	816	7	7	687	1	4	1			2	3	3	6		
Stewiacke	STEW31.2	45.1675	63.0856	DFD BIO	707	7	7	1392		12	9			5		1			1
Stewiacke	STEW32.2	45.2271	62.9454	DFD BIO	459	7	14	1797	30	13	7	3							
Stewiacke	STEW33.1	45.3443	62.8941	DFD BIO	733	7	22	909	1	4	10					11			
Stewiacke	STEW33.2	45.3443	62.8960	DFD BIO	677	7	22	673	2	4	2	1				10			
Stewiacke	STEW34.4	45.3579	62.8659	DFD BIO	635	7	10	967	1	2	17					13			
Stewiacke	STEW34.5	45.3593	62.8656	DFD BIO	427	7	10	1302		3	27					3			
Stewiacke	STEW34.6	45.3604	62.8658	DFD BIO	389	7	10	1581	1	6	25					12			
Stewiacke	STEW35.1	45.2293	63.0513	DFD BIO	534	7	28	863	1	18	2	3		3		3			
Stewiacke	STEW36.1	45.2410	63.0424	DFD BIO	733	7	28	1702	18	15	39	86		3		3		4	
Stewiacke	STEW37.0	45.2071	63.2626	DFD BIO	640	7	9	869		33						1			
Stewiacke	STEW38.0	45.2198	63.2754	DFD BIO	1512	7	9	3170		89				3					3
Stewiacke	STEW39.0	45.1929	63.0096	DFD BIO	324	7	4	1870	51	18	5	2						1	
Stewiacke	STEW4.10	45.2708	62.8681	DFD BIO	704	7	11	1512	25	26	7	2				26		1	
Stewiacke	STEW4.11	45.2702	62.8677	DFD BIO	600	7	10	564	9	17	2	1		1					1
Stewiacke	STEW4.12	45.2694	62.8671	DFD BIO	887	7	10	754	8	13	2	1							
Stewiacke	STEW40.0	45.1826	63.0060	DFD BIO	433	7	15	1177	35	1	15	4							
Stewiacke	STEW8.1	45.2043	62.8893	DFD BIO	1009	7	16	2567	130	8	67	22							
Upper Salmon	USR007	45.6282	64.9762	FNP PC	308	8	21			9	3								
Upper Salmon	USR008	45.6275	64.9746	FNP PC	165	8	20												
Upper Salmon	USR011	45.6105	64.9577	FNP PC	405	8	19			3	1								1
Upper Salmon	USR012	45.6096	64.9583	FNP PC	376	8	18			20	8								11
Upper Salmon	USR013	45.6549	64.9804	FNP PC	325	8	25			5	3								
Upper Salmon	USR014	45.6555	64.9800	FNP PC	358	8	26		2	2	1								

Appendix 2. Details of releases of Live Gene Bank progeny into inner Bay of Fundy Rivers during 2003.

River	Site Description	Lat.	Long.	Day	Month	Stock	Life Stage	Number
Big Salmon River	FOUR MILE BK 1ST OR 2ND BRIDGE	45° 28'	65° 23'	8	10	Big Salmon	0+ parr	1000
Big Salmon River	FOUR MILE LK OUTLET	45° 29'	65° 23'	8	10	Big Salmon	0+ parr	1000
Big Salmon River	FOUR MILE LK OUTLET	45° 29'	65° 23'	8	10	Big Salmon	0+ parr	1000
Big Salmon River	KENNEDY LK BK NEAR SHEPODY BR	45° 36'	65° 18'	8	10	Big Salmon	0+ parr	1200
Big Salmon River	MAIN HEARST LODGE	45° 26'	65° 25'	8	10	Big Salmon	0+ parr	3500
Big Salmon River	MAIN SMOLT WHEEL LOC	45° 25'	65° 25'	8	10	Big Salmon	0+ parr	3000
Big Salmon River	OUTLET WALTON LAKE	45° 36'	65° 19'	8	10	Big Salmon	0+ parr	3500
Big Salmon River	ARNOLD LAKE	45° 30'	65° 21'	8	10	Big Salmon	0+ parr	1000
Big Salmon River	SCHOALES DAM	45° 35'	65° 19'	8	10	Big Salmon	0+ parr	1200
Big Salmon River	STONY LAKE	45° 35'	65° 19'	8	10	Big Salmon	0+ parr	1500
Big Salmon River	WILKINS LAKE	45° 34'	65° 19'	8	10	Big Salmon	0+ parr	1500
Big Salmon River	ABOVE WALTON DAM	45° 32'	65° 20'	9	10	Big Salmon	0+ parr	1000
Big Salmon River	KING POOL	45° 32'	65° 20'	9	10	Big Salmon	0+ parr	2000
Big Salmon River	KING POOL	45° 32'	65° 20'	9	10	Big Salmon	0+ parr	2000
Big Salmon River	MANNING BK BELOW LK OUTLET	45° 33'	65° 21'	9	10	Big Salmon	0+ parr	1000
Big Salmon River	MANNING BK MAIN RD PIPE	45° 32'	65° 20'	9	10	Big Salmon	0+ parr	3000
Big Salmon River	MANNING BK MAIN RD PIPE	45° 32'	65° 20'	9	10	Big Salmon	0+ parr	1921
Big Salmon River	MANNING LAKE	45° 32'	65° 21'	9	10	Big Salmon	0+ parr	1000
Big Salmon River	MID MANNING BROOK	45° 32'	65° 20'	9	10	Big Salmon	0+ parr	2000
Big Salmon River	MANNING BK BELOW LK OUTLET	45° 33'	65° 21'	14	10	Big Salmon	0+ parr	500
Big Salmon River	MANNING BK BELOW LK OUTLET	45° 33'	65° 21'	14	10	Big Salmon	0+ parr	500
Big Salmon River	NW BRANCH FALLS BK ABOVE CLARK LAKE	45° 32'	65° 25'	14	10	Big Salmon	0+ parr	1500
Big Salmon River	NW BRANCH FALLS BK BELOW DICKS LAKE	45° 32'	65° 26'	14	10	Big Salmon	0+ parr	1500
Big Salmon River	NW BRANCH FALLS BK BELOW DICKS LAKE	45° 32'	65° 26'	14	10	Big Salmon	0+ parr	500
Big Salmon River	NW BRANCH SADDLEBACK BK	45° 31'	65° 30'	14	10	Big Salmon	0+ parr	500
Big Salmon River	NW BRANCH SADDLEBACK BK	45° 31'	65° 30'	14	10	Big Salmon	0+ parr	1500
Big Salmon River	NW BRANCH SADDLEBACK BK	45° 31'	65° 30'	14	10	Big Salmon	0+ parr	500
Big Salmon River	NW BRANCH SADDLEBACK BK CULLIGAN BK N&S	45° 30'	65° 30'	14	10	Big Salmon	0+ parr	1000
Big Salmon River	NW BRANCH SADDLEBACK BK CULLIGAN BK N&S	45° 30'	65° 30'	14	10	Big Salmon	0+ parr	250
Big Salmon River	NW BRANCH SADDLEBACK BK CULLIGAN BK N&S	45° 30'	65° 30'	14	10	Big Salmon	0+ parr	250
Big Salmon River	NW BRANCH SADDLEBACK BK DUFFY BK	45° 31'	65° 29'	14	10	Big Salmon	0+ parr	500
Big Salmon River	NW BRANCH SADDLEBACK BK FLAGLAR BK	45° 30'	65° 30'	14	10	Big Salmon	0+ parr	500
Big Salmon River	NW BRANCH UP SADDLEBACK BK	45° 32'	65° 29'	14	10	Big Salmon	0+ parr	500
Big Salmon River	FALLS BK PINE LAKE	45° 31'	65° 25'	14	10	Big Salmon	0+ parr	1000
Big Salmon River	BIG RODY BK EAST TRIB	45° 27'	65° 27'	15	10	Big Salmon	0+ parr	1500
Big Salmon River	BIG RODY BK LR N TRIB	45° 27'	65° 26'	15	10	Big Salmon	0+ parr	1000
Big Salmon River	BIG RODY BK UP N TRIB	45° 27'	65° 26'	15	10	Big Salmon	0+ parr	1500
Big Salmon River	BIG RODY BK UP N TRIB	45° 27'	65° 26'	15	10	Big Salmon	0+ parr	1500
Big Salmon River	BIG RODY BK WEST TRIB	45° 26'	65° 30'	15	10	Big Salmon	0+ parr	1500
Big Salmon River	ANDERSON BK LR S	45° 37'	65° 17'	16	10	Big Salmon	0+ parr	1000
Big Salmon River	ANDERSON BK UNNAMED TRIB	45° 36'	65° 19'	16	10	Big Salmon	0+ parr	679
Big Salmon River	LOWER N ANDERSON BK	45° 38'	65° 17'	16	10	Big Salmon	0+ parr	500
Big Salmon River	UPPER N ANDERSON BK	45° 38'	65° 17'	16	10	Big Salmon	0+ parr	500

Appendix 2 (con't).

River	Site Description	Lat.	Long.	Day	Month	Stock	Life Stage	Number
Big Salmon River	OUTLET WALTON LAKE	45° 36'	65° 19'	21	5	Big Salmon	1+ parr	892
Big Salmon River	MAIN S ANDERSON BK	45° 36'	65° 18'	23	5	Big Salmon	1+ parr	323
Big Salmon River	MAIN SHEPODY BRIDGE	45° 35'	65° 19'	23	5	Big Salmon	1+ parr	750
Big Salmon River	NW BRANCH FALLS BK BELOW DICKS LAKE	45° 32'	65° 26'	26	5	Big Salmon	1+ parr	1162
Big Salmon River	MAIN HEARST LODGE	45° 26'	65° 25'	2	6	Big Salmon	1+ parr	92
Big Salmon River	ABOVE WALTON DAM	45° 32'	65° 20'	3	6	Big Salmon	1+ parr	463
Big Salmon River	BRIDGE POOL	45° 31'	65° 21'	3	6	Big Salmon	1+ parr	262
Big Salmon River	BRIDGE POOL	45° 31'	65° 21'	3	6	Big Salmon	1+ parr	524
Big Salmon River	FOUR MILE BK 1ST OR 2ND BRIDGE	45° 28'	65° 23'	3	6	Big Salmon	1+ parr	262
Big Salmon River	FOUR MILE LK OUTLET	45° 29'	65° 23'	3	6	Big Salmon	1+ parr	262
Big Salmon River	FOUR MILE LK OUTLET	45° 29'	65° 23'	3	6	Big Salmon	1+ parr	262
Big Salmon River	KING POOL	45° 32'	65° 20'	3	6	Big Salmon	1+ parr	524
Big Salmon River	KING POOL	45° 32'	65° 20'	3	6	Big Salmon	1+ parr	1571
Big Salmon River	MAIN SHEPODY BRIDGE	45° 35'	65° 19'	3	6	Big Salmon	1+ parr	1048
Big Salmon River	MANNING BK BELOW LK OUTLET	45° 33'	65° 21'	3	6	Big Salmon	1+ parr	262
Big Salmon River	MANNING BK BRIDGE ABOVE LAKE INLET	45° 32'	65° 21'	3	6	Big Salmon	1+ parr	262
Big Salmon River	MANNING BK MAIN RD PIPE	45° 32'	65° 20'	3	6	Big Salmon	1+ parr	341
Big Salmon River	MANNING LAKE	45° 32'	65° 21'	3	6	Big Salmon	1+ parr	524
Big Salmon River	MID MANNING BROOK	45° 32'	65° 20'	3	6	Big Salmon	1+ parr	524
Big Salmon River	ARNOLD LAKE	45° 30'	65° 21'	3	6	Big Salmon	1+ parr	524
Big Salmon River	STONY LAKE	45° 35'	65° 19'	3	6	Big Salmon	1+ parr	654
Big Salmon River	WILKINS LAKE	45° 34'	65° 19'	3	6	Big Salmon	1+ parr	654
Big Salmon River	ANDERSON BK LR S	45° 37'	65° 17'	4	6	Big Salmon	1+ parr	437
Big Salmon River	KENNEDY LK BK NEAR SHEPODY BR	45° 36'	65° 18'	4	6	Big Salmon	1+ parr	794
Big Salmon River	LOWER N ANDERSON BK	45° 38'	65° 17'	4	6	Big Salmon	1+ parr	437
Big Salmon River	MAIN S ANDERSON BK	45° 36'	65° 18'	4	6	Big Salmon	1+ parr	786
Big Salmon River	MANNING BK BELOW LK OUTLET	45° 33'	65° 21'	4	6	Big Salmon	1+ parr	392
Big Salmon River	NW BRANCH FALLS BK ABOVE CLARK LAKE	45° 32'	65° 25'	4	6	Big Salmon	1+ parr	524
Big Salmon River	NW BRANCH FALLS BK BELOW DICKS LAKE	45° 32'	65° 26'	4	6	Big Salmon	1+ parr	524
Big Salmon River	NW BRANCH FALLS BK BELOW DICKS LAKE	45° 32'	65° 26'	4	6	Big Salmon	1+ parr	786
Big Salmon River	NW BRANCH FALLS BK BELOW DICKS LAKE	45° 32'	65° 26'	4	6	Big Salmon	1+ parr	392
Big Salmon River	NW BRANCH SADDLEBACK BK	45° 31'	65° 30'	4	6	Big Salmon	1+ parr	262
Big Salmon River	NW BRANCH SADDLEBACK BK	45° 31'	65° 30'	4	6	Big Salmon	1+ parr	262
Big Salmon River	NW BRANCH SADDLEBACK BK	45° 31'	65° 30'	4	6	Big Salmon	1+ parr	392
Big Salmon River	NW BRANCH SADDLEBACK BK FLAGLAR BK	45° 30'	65° 30'	4	6	Big Salmon	1+ parr	262
Big Salmon River	OUTLET WALTON LAKE	45° 36'	65° 19'	4	6	Big Salmon	1+ parr	1410
Big Salmon River	FALLS BK PINE LAKE	45° 31'	65° 25'	4	6	Big Salmon	1+ parr	524
Big Salmon River	SCHOALES DAM	45° 35'	65° 19'	4	6	Big Salmon	1+ parr	262
Big Salmon River	UPPER S ANDERSON BK	45° 38'	65° 17'	4	6	Big Salmon	1+ parr	437
Big Salmon River	KING POOL	45° 32'	65° 20'	29	9	Big Salmon	Adult	4
Big Salmon River	LODGE POOL	45° 27'	65° 25'	29	9	Big Salmon	Adult	4
Big Salmon River	KING POOL	45° 32'	65° 20'	8	10	Big Salmon	Adult	3
Big Salmon River	LODGE POOL	45° 27'	65° 25'	8	10	Big Salmon	Adult	4
Big Salmon River	MAIN HEARST LODGE	45° 26'	65° 25'	14	5	Big Salmon	Smolt	534
Big Salmon River	MAIN HEARST LODGE	45° 26'	65° 25'	21	5	Big Salmon	Smolt	500

Appendix 2 (con't).

River	Site Description	Lat.	Long.	Day	Month	Stock	Life Stage	Number
Big Salmon River	OUTLET WALTON LAKE	45° 36'	65° 19'	21	5	Big Salmon	Smolt	2676
Big Salmon River	MAIN S ANDERSON BK	45° 36'	65° 18'	23	5	Big Salmon	Smolt	968
Big Salmon River	MAIN SHEPODY BRIDGE	45° 35'	65° 19'	23	5	Big Salmon	Smolt	2250
Big Salmon River	NW BRANCH FALLS BK BELOW DICKS LAKE	45° 32'	65° 26'	26	5	Big Salmon	Smolt	3486
Big Salmon River	MAIN HEARST LODGE	45° 26'	65° 25'	27	5	Big Salmon	Smolt	492
Big Salmon River	MAIN HEARST LODGE	45° 26'	65° 25'	2	6	Big Salmon	Smolt	490
Big Salmon River	MAIN HEARST LODGE	45° 26'	65° 25'	2	6	Big Salmon	Smolt	276
Big Salmon River	ABOVE WALTON DAM	45° 32'	65° 20'	3	6	Big Salmon	Smolt	51
Big Salmon River	BRIDGE POOL	45° 31'	65° 21'	3	6	Big Salmon	Smolt	29
Big Salmon River	BRIDGE POOL	45° 31'	65° 21'	3	6	Big Salmon	Smolt	58
Big Salmon River	FOUR MILE BK 1ST OR 2ND BRIDGE	45° 28'	65° 23'	3	6	Big Salmon	Smolt	29
Big Salmon River	FOUR MILE LK OUTLET	45° 29'	65° 23'	3	6	Big Salmon	Smolt	29
Big Salmon River	FOUR MILE LK OUTLET	45° 29'	65° 23'	3	6	Big Salmon	Smolt	29
Big Salmon River	KING POOL	45° 32'	65° 20'	3	6	Big Salmon	Smolt	58
Big Salmon River	KING POOL	45° 32'	65° 20'	3	6	Big Salmon	Smolt	175
Big Salmon River	MAIN SHEPODY BRIDGE	45° 35'	65° 19'	3	6	Big Salmon	Smolt	116
Big Salmon River	MANNING BK BELOW LK OUTLET	45° 33'	65° 21'	3	6	Big Salmon	Smolt	29
Big Salmon River	MANNING BK BRIDGE ABOVE LAKE INLET	45° 32'	65° 21'	3	6	Big Salmon	Smolt	29
Big Salmon River	MANNING BK MAIN RD PIPE	45° 32'	65° 20'	3	6	Big Salmon	Smolt	38
Big Salmon River	MANNING LAKE	45° 32'	65° 21'	3	6	Big Salmon	Smolt	58
Big Salmon River	MID MANNING BROOK	45° 32'	65° 20'	3	6	Big Salmon	Smolt	58
Big Salmon River	ARNOLD LAKE	45° 30'	65° 21'	3	6	Big Salmon	Smolt	58
Big Salmon River	STONY LAKE	45° 35'	65° 19'	3	6	Big Salmon	Smolt	73
Big Salmon River	WILKINS LAKE	45° 34'	65° 19'	3	6	Big Salmon	Smolt	73
Big Salmon River	ANDERSON BK LR S	45° 37'	65° 17'	4	6	Big Salmon	Smolt	48
Big Salmon River	KENNEDY LK BK NEAR SHEPODY BR	45° 36'	65° 18'	4	6	Big Salmon	Smolt	88
Big Salmon River	LOWER N ANDERSON BK	45° 38'	65° 17'	4	6	Big Salmon	Smolt	48
Big Salmon River	MAIN S ANDERSON BK	45° 36'	65° 18'	4	6	Big Salmon	Smolt	87
Big Salmon River	MANNING BK BELOW LK OUTLET	45° 33'	65° 21'	4	6	Big Salmon	Smolt	44
Big Salmon River	NW BRANCH FALLS BK ABOVE CLARK LAKE	45° 32'	65° 25'	4	6	Big Salmon	Smolt	58
Big Salmon River	NW BRANCH FALLS BK BELOW DICKS LAKE	45° 32'	65° 26'	4	6	Big Salmon	Smolt	58
Big Salmon River	NW BRANCH FALLS BK BELOW DICKS LAKE	45° 32'	65° 26'	4	6	Big Salmon	Smolt	87
Big Salmon River	NW BRANCH FALLS BK BELOW DICKS LAKE	45° 32'	65° 26'	4	6	Big Salmon	Smolt	44
Big Salmon River	NW BRANCH SADDLEBACK BK	45° 31'	65° 30'	4	6	Big Salmon	Smolt	29
Big Salmon River	NW BRANCH SADDLEBACK BK	45° 31'	65° 30'	4	6	Big Salmon	Smolt	29
Big Salmon River	NW BRANCH SADDLEBACK BK	45° 31'	65° 30'	4	6	Big Salmon	Smolt	44
Big Salmon River	NW BRANCH SADDLEBACK BK FLAGLAR BK	45° 30'	65° 30'	4	6	Big Salmon	Smolt	29
Big Salmon River	OUTLET WALTON LAKE	45° 36'	65° 19'	4	6	Big Salmon	Smolt	157
Big Salmon River	FALLS BK PINE LAKE	45° 31'	65° 25'	4	6	Big Salmon	Smolt	58
Big Salmon River	SCHOALES DAM	45° 35'	65° 19'	4	6	Big Salmon	Smolt	29
Big Salmon River	UPPER S ANDERSON BK	45° 38'	65° 17'	4	6	Big Salmon	Smolt	48
Big Salmon River	BIG RODY BK EAST TRIB	45° 27'	65° 27'	5	6	Big Salmon	Unfed fry	15000
Big Salmon River	BIG RODY BK MIDDLE TRIB	45° 26'	65° 29'	5	6	Big Salmon	Unfed fry	5000
Big Salmon River	BIG RODY BK UP N TRIB	45° 27'	65° 26'	5	6	Big Salmon	Unfed fry	10000
Big Salmon River	BIG RODY BK WEST TRIB	45° 26'	65° 30'	5	6	Big Salmon	Unfed fry	10000

Appendix 2 (con't).

River	Site Description	Lat.	Long.	Day	Month	Stock	Life Stage	Number
Big Salmon River	KENNEDY LK BK NEAR SHEPODY BR	45° 36'	65° 18'	6	6	Big Salmon	Unfed fry	10000
Big Salmon River	OUTLET WALTON LAKE	45° 36'	65° 19'	6	6	Big Salmon	Unfed fry	10000
Big Salmon River	SCHOALES DAM	45° 35'	65° 19'	6	6	Big Salmon	Unfed fry	10000
Big Salmon River	STONY LAKE	45° 35'	65° 19'	6	6	Big Salmon	Unfed fry	10000
Big Salmon River	WILKINS LAKE	45° 34'	65° 19'	6	6	Big Salmon	Unfed fry	9948
Big Salmon River	LOWER N ANDERSON BK	45° 38'	65° 17'	9	6	Big Salmon	Unfed fry	5141
Big Salmon River	MAIN S ANDERSON BK	45° 36'	65° 18'	9	6	Big Salmon	Unfed fry	10000
Big Salmon River	NEAR ADAIRS LODGE EF SITE	45° 36'	65° 19'	9	6	Big Salmon	Unfed fry	10000
Big Salmon River	UPPER N ANDERSON BK	45° 38'	65° 17'	9	6	Big Salmon	Unfed fry	10000
Big Salmon River	UPPER S ANDERSON BK	45° 38'	65° 17'	9	6	Big Salmon	Unfed fry	10000
Big Salmon River	FOUR MILE BK 1ST OR 2ND BRIDGE	45° 28'	65° 23'	10	6	Big Salmon	Unfed fry	9887
Big Salmon River	FOUR MILE LK OUTLET	45° 29'	65° 23'	10	6	Big Salmon	Unfed fry	9885
Big Salmon River	FOUR MILE LK OUTLET	45° 29'	65° 23'	10	6	Big Salmon	Unfed fry	9885
Big Salmon River	ARNOLD LAKE	45° 30'	65° 21'	10	6	Big Salmon	Unfed fry	20000
Big Salmon River	MANNING BK BELOW LK OUTLET	45° 33'	65° 21'	12	6	Big Salmon	Unfed fry	6111
Big Salmon River	NW BRANCH FALLS BK ABOVE CLARK LAKE	45° 32'	65° 25'	12	6	Big Salmon	Unfed fry	6111
Big Salmon River	NW BRANCH FALLS BK BELOW DICKS LAKE	45° 32'	65° 26'	12	6	Big Salmon	Unfed fry	6112
Big Salmon River	NW BRANCH FALLS BK BELOW DICKS LAKE	45° 32'	65° 26'	12	6	Big Salmon	Unfed fry	6111
Big Salmon River	NW BRANCH FALLS BK BELOW DICKS LAKE	45° 32'	65° 26'	12	6	Big Salmon	Unfed fry	6111
Big Salmon River	NW BRANCH SADDLEBACK BK	45° 31'	65° 30'	12	6	Big Salmon	Unfed fry	6111
Big Salmon River	NW BRANCH SADDLEBACK BK	45° 31'	65° 30'	12	6	Big Salmon	Unfed fry	6111
Big Salmon River	NW BRANCH SADDLEBACK BK FLAGLAR BK	45° 30'	65° 30'	12	6	Big Salmon	Unfed fry	6111
Big Salmon River	FALLS BK PINE LAKE	45° 31'	65° 25'	12	6	Big Salmon	Unfed fry	6111
Big Salmon River	BRIDGE POOL	45° 31'	65° 21'	13	6	Big Salmon	Unfed fry	9512
Big Salmon River	BRIDGE POOL	45° 31'	65° 21'	13	6	Big Salmon	Unfed fry	9512
Big Salmon River	KENNEDY LK BK NEAR SHEPODY BR	45° 36'	65° 18'	13	6	Big Salmon	Unfed fry	9512
Big Salmon River	KING POOL	45° 32'	65° 20'	13	6	Big Salmon	Unfed fry	9512
Big Salmon River	MANNING BK MAIN RD PIPE	45° 32'	65° 20'	13	6	Big Salmon	Unfed fry	9512
Big Salmon River	MID MANNING BROOK	45° 32'	65° 20'	13	6	Big Salmon	Unfed fry	9512
Point Wolfe River	MAIN KEY HOLE POOL	45° 36'	65° 08'	16	10	Big Salmon	Adult	12
Point Wolfe River	MAIN KEY HOLE POOL	45° 36'	65° 08'	16	10	Big Salmon	Adult	135
Point Wolfe River	MAIN LR OXBOW POOL	45° 36'	65° 07'	17	10	Big Salmon	Adult	12
Point Wolfe River	WOLFE MAIN LR OXBOW POOL	45° 36'	65° 07'	17	10	Big Salmon	Adult	127
Petitcodiac River	LITTLE HOPPER BRIDGE	45° 56'	64° 58'	13	5	Big Salmon	Adult	275
Petitcodiac River	LITTLE R BULL CK	45° 56'	64° 59'	16	5	Big Salmon	Adult	275
Folly River	FOLLY DEBERT LR MAIN BRIDGE	45° 24'	63° 29'	14	10	Stewiacke	0+ parr	5294
Folly River	FOLLY DEBERT LR PINE BROOK	45° 26'	63° 29'	14	10	Stewiacke	0+ parr	5070
Folly River	FOLLY DEBERT MIDDLE PINE BK EAST MINES	45° 26'	63° 29'	14	10	Stewiacke	0+ parr	5294
Folly River	FOLLY DEBERT TOTTEN BROOK MIDDLE	45° 29'	63° 28'	14	10	Stewiacke	0+ parr	5294
Folly River	FOLLY DEBERT UP PINE BK	45° 29'	63° 29'	14	10	Stewiacke	0+ parr	6000
Folly River	FOLLY LOWER DEBERT UNNAMED TRIBUTARY	45° 25'	63° 29'	14	10	Stewiacke	0+ parr	4489
Folly River	FOLLY MAIN DEBERT CHURCH CAMP	45° 27'	63° 28'	14	10	Stewiacke	0+ parr	5070
Folly River	FOLLY R DEBERT R DEBERT PONDS	45° 26'	63° 28'	14	10	Stewiacke	0+ parr	5294
Folly River	FOLLY LOWER UNNAMED TRIBUTARY	45° 25'	63° 31'	21	10	Stewiacke	0+ parr	5300
Folly River	FOLLY LOWER FOLLY LAKE	45° 31'	63° 33'	21	10	Stewiacke	0+ parr	5300

Appendix 2 (con't).

River	Site Description	Lat.	Long.	Day	Month	Stock	Life Stage	Number
Folly River	FOLLY MAIN AT EAST FOLLY MOUNTAIN	45° 29'	63° 32'	21	10	Stewiacke	0+ parr	5200
Folly River	FOLLY MAIN TRAIN BRIDGE	45° 27'	63° 32'	21	10	Stewiacke	0+ parr	5300
Folly River	FOLLY R FOLLY LAKE	45° 32'	63° 33'	21	10	Stewiacke	0+ parr	12600
Folly River	FOLLY R FOLLY LAKE	45° 32'	63° 33'	21	10	Stewiacke	0+ parr	4773
Folly River	FOLLY RIVER MAIN BRIDGE	45° 27'	63° 31'	21	10	Stewiacke	0+ parr	5300
Folly River	FOLLY MAIN DEBERT AT CAMPS	45° 29'	63° 27'	22	10	Stewiacke	0+ parr	6000
Folly River	FOLLY DEBERT ELM RIVER PARK	45° 24'	63° 31'	7	7	Stewiacke	6 week fry	8500
Folly River	FOLLY DEBERT LR PINE BROOK	45° 26'	63° 29'	7	7	Stewiacke	6 week fry	4250
Folly River	FOLLY DEBERT MIDDLE PINE BK EAST MINES	45° 26'	63° 29'	7	7	Stewiacke	6 week fry	4250
Folly River	FOLLY MAIN AT EAST FOLLY MOUNTAIN	45° 29'	63° 32'	7	7	Stewiacke	6 week fry	8500
Folly River	FOLLY MAIN DEBERT AT CAMPS	45° 29'	63° 27'	7	7	Stewiacke	6 week fry	8500
Folly River	FOLLY MAIN DEBERT CHURCH CAMP	45° 27'	63° 28'	7	7	Stewiacke	6 week fry	8500
Folly River	FOLLY MAIN TRAIN BRIDGE	45° 27'	63° 32'	7	7	Stewiacke	6 week fry	8500
Folly River	FOLLY RIVER MAIN BRIDGE	45° 27'	63° 31'	7	7	Stewiacke	6 week fry	8500
Folly River	FOLLY R FOLLY LAKE	45° 32'	63° 33'	9	7	Stewiacke	6 week fry	9500
Folly River	FOLLY DEBERT LR PINE BROOK	45° 26'	63° 29'	21	5	Stewiacke	Unfed fry	10436
Folly River	FOLLY DEBERT MIDDLE PINE BK EAST MINES	45° 26'	63° 29'	21	5	Stewiacke	Unfed fry	10436
Folly River	FOLLY DEBERT UP PINE BK	45° 29'	63° 29'	21	5	Stewiacke	Unfed fry	1043
Folly River	FOLLY MAIN DEBERT AT CAMPS	45° 29'	63° 27'	21	5	Stewiacke	Unfed fry	17909
Folly River	FOLLY MCELMON BROOK	45° 29'	63° 34'	21	5	Stewiacke	Unfed fry	4845
Folly River	FOLLY R DEBERT TOTTEN BROOK ON PETES BK	45° 28'	63° 28'	21	5	Stewiacke	Unfed fry	9982
Folly River	FOLLY RIVER TUNNEL BROOK	45° 29'	63° 32'	21	5	Stewiacke	Unfed fry	4845
Chiganois River	LR BEAVER BROOK	45° 26'	63° 22'	22	10	Stewiacke	0+ parr	7430
Chiganois River	MAIN AT BELMONT	45° 25'	63° 23'	22	10	Stewiacke	0+ parr	3166
Chiganois River	MAIN JUST NORTH OF HW 104	45° 24'	63° 24'	22	10	Stewiacke	0+ parr	5000
Chiganois River	STAPLES BROOK LOWER	45° 26'	63° 24'	22	10	Stewiacke	0+ parr	4000
Chiganois River	MAIN AT STAPLES BROOK	45° 27'	63° 23'	24	10	Stewiacke	0+ parr	3166
Chiganois River	STAPLES BROOK LOWER	45° 25'	63° 24'	24	10	Stewiacke	0+ parr	3166
Chiganois River	STAPLES BROOK LR UPPER	45° 27'	63° 24'	24	10	Stewiacke	0+ parr	6992
Chiganois River	MAIN JUST NORTH OF HW 104	45° 24'	63° 24'	7	7	Stewiacke	6 week fry	4750
Chiganois River	LR BEAVER BROOK	45° 26'	63° 22'	9	7	Stewiacke	6 week fry	8500
Chiganois River	LOWER LIGHTBODY BROOK	45° 24'	63° 24'	9	7	Stewiacke	6 week fry	4750
Chiganois River	MAIN AT BELMONT	45° 25'	63° 23'	9	7	Stewiacke	6 week fry	4750
Chiganois River	MAIN AT STAPLES BROOK	45° 27'	63° 23'	9	7	Stewiacke	6 week fry	4750
Chiganois River	MAIN AT STAPLES BROOK	45° 27'	63° 23'	9	7	Stewiacke	6 week fry	4750
Chiganois River	STAPLES BROOK LR UPPER	45° 27'	63° 24'	9	7	Stewiacke	6 week fry	4750
Chiganois River	STAPLES BROOK UP UPPER	45° 28'	63° 24'	9	7	Stewiacke	6 week fry	4750
Chiganois River	UPPER LIGHTBODY BROOK	45° 26'	63° 24'	9	7	Stewiacke	6 week fry	4750
Chiganois River	LR BEAVER BROOK	45° 26'	63° 22'	21	5	Stewiacke	Unfed fry	8695
Chiganois River	UPPER BEAVER BROOK	45° 24'	63° 24'	21	5	Stewiacke	Unfed fry	8695
Chiganois River	STAPLES BROOK LOWER	45° 26'	63° 24'	21	5	Stewiacke	Unfed fry	8695
Chiganois River	STAPLES BROOK LR UPPER	45° 27'	63° 24'	21	5	Stewiacke	Unfed fry	4347
Chiganois River	STAPLES BROOK UP UPPER	45° 28'	63° 24'	21	5	Stewiacke	Unfed fry	12173
Salmon River (Col)	BELOW IRVING PULP MILL	45° 23'	63° 12'	15	10	Stewiacke	Adult	77
Salmon River (Col)	BELOW IRVING PULP MILL	45° 23'	63° 12'	15	10	Stewiacke	Adult	38

Appendix 2 (con't).

River	Site Description	Lat.	Long.	Day	Month	Stock	Life Stage	Number
Salmon River (Col)	COL BETWEEN BLACK R AND JOHN CROWES	45° 26'	63° 08'	30	10	Stewiacke	Adult	18
Stewiacke River	SOUTH BRANCH GOSHEN BK	45° 11'	63° 01'	17	10	Stewiacke	0+ parr	3000
Stewiacke River	SUTHERLAND BROOK	45° 24'	62° 53'	17	10	Stewiacke	0+ parr	5000
Stewiacke River	EAST BK	45° 12'	63° 12'	17	10	Stewiacke	0+ parr	3000
Stewiacke River	FISHER BK	45° 12'	63° 10'	17	10	Stewiacke	0+ parr	3000
Stewiacke River	WATERING BK COVERDALE	45° 10'	63° 15'	17	10	Stewiacke	0+ parr	3000
Stewiacke River	MAIN AB SPRINGSIDE AT BRIDGE	45° 19'	62° 53'	17	10	Stewiacke	0+ parr	5000
Stewiacke River	UPP RUTHERFORD BK	45° 18'	63° 08'	17	10	Stewiacke	0+ parr	5000
Stewiacke River	EAST ROCK PILE POOL	45° 09'	63° 17'	14	5	Stewiacke	Smolt	730
Stewiacke River	EAST ROCK PILE POOL	45° 09'	63° 17'	14	5	Stewiacke	Smolt	1142
Stewiacke River	BIRCH HILL BRDG#1	45° 13'	63° 12'	14	5	Stewiacke	Smolt	2191
Stewiacke River	BIRCH HILL BRDG#1	45° 13'	63° 12'	14	5	Stewiacke	Smolt	3427
Stewiacke River	MIDDLE STEWIACKE	45° 13'	63° 09'	14	5	Stewiacke	Smolt	1377
Stewiacke River	MIDDLE STEWIACKE	45° 13'	63° 09'	14	5	Stewiacke	Smolt	949
Stewiacke River	UP MAIN AT MASONIC HALL	45° 13'	63° 00'	14	5	Stewiacke	Smolt	4133
Stewiacke River	UP MAIN AT MASONIC HALL	45° 13'	63° 00'	14	5	Stewiacke	Smolt	2848
Stewiacke River	SHEEP HERDERS JCT	45° 23'	62° 51'	21	5	Stewiacke	Unfed fry	5550
Stewiacke River	RUSSEL LK BK	45° 23'	63° 49'	21	5	Stewiacke	Unfed fry	5550
Stewiacke River	BIG BRANCH LITTLE BRANCH BRIDGE	45° 20'	62° 55'	21	5	Stewiacke	Unfed fry	7000
Stewiacke River	BIG BRANCH LITTLE BRANCH MEADOW LK	45° 20'	62° 56'	21	5	Stewiacke	Unfed fry	5550
Stewiacke River	OTTER FALL BK	45° 15'	63° 02'	21	5	Stewiacke	Unfed fry	5550
Stewiacke River	OTTER GEDDES BRIDGE	45° 15'	63° 02'	21	5	Stewiacke	Unfed fry	5550
Gaspereau River	LANES MILL BRIDGE	44° 55'	64° 31'	9	10	Gaspereau	0+ parr	7242
Gaspereau River	HELLS GATE	45° 03'	64° 25'	9	10	Gaspereau	0+ parr	7242
Gaspereau River	VILLAGE BRIDGE	45° 04'	64° 21'	9	10	Gaspereau	0+ parr	3621
Gaspereau River	WHITE ROCK(SITE#1)	45° 03'	64° 24'	9	10	Gaspereau	0+ parr	3621
Gaspereau River	WHITE ROCK(SITE#1)	45° 03'	64° 24'	25	4	Gaspereau	1+ parr	9500
Gaspereau River	LANES MILL BRIDGE	44° 55'	64° 31'	28	4	Gaspereau	1+ parr	9100
Gaspereau River	VILLAGE BRIDGE	45° 04'	64° 21'	2	5	Gaspereau	Smolt	5000
Gaspereau River	LANES MILL BRIDGE	44° 55'	64° 31'	5	5	Gaspereau	Smolt	9372
Gaspereau River	LANES MILL BRIDGE	44° 55'	64° 31'	9	5	Gaspereau	Smolt	500
Gaspereau River	DEEP HOLLOW BRIDGE	45° 05'	64° 16'	9	5	Gaspereau	Smolt	500
Gaspereau River	VILLAGE BRIDGE	45° 04'	64° 21'	9	5	Gaspereau	Smolt	3500
Gaspereau River	VILLAGE BRIDGE	45° 04'	64° 21'	9	5	Gaspereau	Smolt	8050
Gaspereau River	WHITEROCK(SITE#1)	45° 03'	64° 24'	9	5	Gaspereau	Smolt	500